# Contents

## SECTION I. STATUS AND OUTLOOK

3  Preface

4  Acknowledgments

5  🌾 Situation and Outlook for Small Grains

11 🍎 2020 Washington Tree Fruit Outlook

17 🍇 Specialty Crops

21 🐂 Washington Beef Cattle Sector Review and Outlook

26 🐄 Dairy Sector Review and Outlook

31 🌱 2020 Forestry Sector Review

38 🌍 Macroeconomic Conditions and Washington Agriculture

## SECTION II. SPECIAL FOCUS

43 🍏 COVID-19 & the Washington Apple Industry

46 🍔 COVID-19 and Washington State Potatoes

## SECTION III. WASHINGTON DATA
WASHINGTON Agribusiness: Status and Outlook is an annual publication prepared by Washington State University faculty in the School of Economic Sciences. It is intended to be a concise overview of Washington's current and near-term agricultural activity. The publication is broken into two primary sections. Section I reviews the status of various sub-sectors in agriculture and provides short-term projections or areas of focus moving forward. Section II provides specialty research focused on agricultural economic issues such as animal health, water constraints, etc. A version of this report will be available online through the School of Economic Sciences. Feedback on this issue and suggestions for future featured articles is most welcome. Specific questions regarding focus areas in the report should be directed to the managing editor who will work with the primary authors to provide responses.

Randy Fortenbery, Executive Editor  
School of Economic Sciences  
Washington State University  
Pullman, WA 99163  
(509) 335-7637  
r.fortenbery@wsu.edu

Timothy P. Nadreau, Managing Editor  
School of Economic Sciences  
Washington State University  
Pullman, WA 99163  
(509) 335-0495  
timothy.nadreau@wsu.edu

January 2021
ACKNOWLEDGMENTS

This publication was made possible through the financial support of the Washington Grain Commission, Washington State University’s College of Agriculture, Human, and Natural Resource Sciences Office of Research, Washington State University’s School of Economic Sciences, University of Washington’s CINTRAFOR department, and Washington State University’s IMPACT Center. We are grateful to Peacock and Pen Graphic Design for their help with the report layout and design and to Elli Sensing for external editorial support. We are also indebted to the following contributors.

Michael Brady, Ph.D.
Assistant Professor
(509) 335-0970
bradym@wsu.edu

Randy Fortenbery, Ph.D.
Professor, Small Grains Endowed Chair
(509) 335-7637
r.fortenbery@wsu.edu

Karina Gallardo, Ph.D.
Associate Professor, Extension Specialist
(253) 445-4584
karina_gallardo@wsu.edu

Mark Gibson, Ph.D.
Assistant Professor
(509) 335-7641
mjgibson@wsu.edu

Kent Wheiler, Ph.D.
Director and Associate Professor
(253) 218-8872
kwheiler@uw.edu

Timothy Nadreau, Ph.D.
Research Associate
(509) 335-0495
timothy.nadreau@wsu.edu

Shannon Neibergs, Ph.D.
Associate Professor
(509) 335-6360
sneibergs@wsu.edu
SECTION I. STATUS AND OUTLOOK

Situation and Outlook for Small Grains
T. Randall Fortenbery (509) 335-7637

According to December 2020 estimates from the Economics Research Service (ERS) of the United States Department of Agriculture (USDA), U.S. farm receipts for 2020 were the lowest received in four years, and the second lowest since 2011. However, receipts for crops were the highest since 2014, but there is significant variation among crops.

USDA’s current Farm Sector Income Forecast estimates that U.S. net farm income in 2020 will exceed the 2019 level by about 43 percent. Total receipts by U.S. crop farmers are projected to exceed 2019 levels by 3.3 percent on a nominal basis, with farm receipts from the sale of animals and animal products declining 5.5 percent year-over-year. Direct government payments contributed significantly to 2020 U.S. farm income. USDA estimates that total government payments to agricultural producers in 2020 totaled almost $46.5 billion, compared to about $22.5 billion in 2019 and $13.7 billion in 2018. By far the largest percentage ($32.4 billion) came from the supplemental and ad hoc disaster assistance program. This program includes payments from the Coronavirus Food Assistance Programs (CFAP1 and CFAP2), as well as loans from the Small Business Administration’s Paycheck Assistance Program (PPP). The total payments to producers from the supplemental and ad hoc disaster assistance program in 2019 were less than $1.5 billion, and prior to that had not exceeded $1 billion since 2015.

The second largest government payment to farmers in 2020 came from the Price Loss Coverage Program (PLC). This program pays grain farmers who elected to participate in the PLC program if average annual crop year prices fall below trigger levels. Crop years vary by commodity based on harvest – for wheat and barley, the two most important grain crops in Washington, the crop year runs from June 1 through May 31 of the following year. Thus, PLC payments to Washington wheat and barley producers received in Fall 2020 were determined by the average crop prices from June 1, 2019 through May 31, 2020.

Wheat

Wheat producers did not share in the general increase in crop receipts seen by U.S. farmers in 2020. They received about $8.56 billion in sales revenue, a decline of about 1 percent compared to 2019. This is the lowest sales level since 2006, when U.S. wheat receipts totaled just over $7 billion (Figure 1).

Large wheat supplies, both domestic and global, contributed to wheat revenue declines in 2020. Over the last several years, the world has generally produced more wheat than it has consumed, pressuring prices.

Figure 2.A shows the relationship between U.S. wheat supply and domestic wheat prices over the last three decades. Notice that U.S. wheat supply is expected to be down about four percent for the 2020/2021 marketing year compared to previous years, but average wheat prices are expected to improve by only 2.5 percent. The less robust price response can be explained by Figure 2.B. This shows the U.S. wheat price compared to world wheat supply. Given that the U.S. accounts for about 8 percent of total world wheat supplies, it should come as no surprise that world supply/demand conditions influence domestic prices to a greater extent than the domestic balance sheet. World wheat production has steadily increased over the last 9 or 10 years, and this has pressured U.S. prices.
Figure 1: Farm Level Wheat Receipts

- U.S.
- Washington

Figure 2.A: U.S. Wheat Supply vs. U.S. Price
- U.S. total supply
- Marketing year price

Figure 2.B: World Wheat Supply vs. U.S. Price
- World total supply
- Marketing year price

Source: United States Department of Agriculture, Economic Research Service. Farm and Income Wealth Statistics

Source: United States Department of Agriculture, World Outlook Board

Source: United States Department of Agriculture, Foreign Ag Service
Despite the bearish world supply/demand picture for wheat, the U.S. balance sheet is expected to improve this marketing year compared to last. As of mid-December 2020, USDA forecast total U.S. wheat exports for the marketing year would be up about 2 percent, and 5 percent above exports in the 2018/2019 marketing year. In addition, 2020 production was less than 2019 production, and domestic use is expected to increase this marketing year compared to last. This, in turn, contributes to the expectation that there will be less wheat leftover going into next summer’s harvest compared to recent years. USDA estimates the U.S. had 1.03 billion bushels of wheat in storage as of May 31, 2020, going into last summer (Table 1). This was added to 2020 production to determine the total U.S. wheat supply for the 2020/2021 marketing year. The current forecast for May 31, 2021 wheat stocks is 862 million bushels—a reduction of about 19 percent. This is what will be added to next summer’s harvest to determine total domestic wheat supplies from June 1, 2021 through May 31, 2022.

The most important class of wheat for Washington producers is Soft White wheat. This class is unique not only because it is considered a higher-than-average quality wheat, demanded by relatively high-income foreign consumers, but also because it is grown almost exclusively in the Pacific Northwest.

The forecast balance sheet for U.S. Soft White wheat is not quite as favorable as the overall wheat balance sheet in the 2020/2021 marketing year. Exports of Soft White are expected to exceed exports last marketing year by almost 15 percent. However, a production increase of almost 11 percent this past summer, combined with reduced domestic use, suggests that ending stocks in May 2021 will almost equal last year’s ending stocks.

If we include all classes, Washington wheat farmers harvested about 16 percent more wheat in 2020 compared to 2019. Despite this, Washington wheat farmers enjoy average prices—across all classes of wheat they produce (the majority of which is Soft White) —that are significantly higher than national average wheat prices. This has consistently been the case since April 2019 (Figure 3).

In 2019 (the most recent data available), wheat sales by Washington farmers totaled $774 million. This represented about 9 percent of the value of total wheat sales in the U.S., and about 8.3 percent of total agricultural sales by farmers in Washington. In 2019, wheat ranked as the 5th most valuable agricultural commodity in Washington, coming

Table 1: U.S. Wheat Balance Sheet (June/May) – Based on Dec 2020 WASDE – USDA

<table>
<thead>
<tr>
<th>Marketing Year</th>
<th>USDA 13/14</th>
<th>USDA 14/15</th>
<th>USDA 15/16</th>
<th>USDA 16/17</th>
<th>USDA 17/18</th>
<th>USDA 18/19</th>
<th>USDA Dec Est 19/20</th>
<th>USDA Dec Fore 19/20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beg Stocks</td>
<td>718</td>
<td>590</td>
<td>752</td>
<td>976</td>
<td>1,181</td>
<td>1,099</td>
<td>1,080</td>
<td>1,080</td>
</tr>
<tr>
<td>Imports</td>
<td>169</td>
<td>151</td>
<td>113</td>
<td>118</td>
<td>157</td>
<td>135</td>
<td>105</td>
<td>105</td>
</tr>
<tr>
<td>Acres Planted</td>
<td>56.2</td>
<td>56.8</td>
<td>55</td>
<td>50.1</td>
<td>46.1</td>
<td>47.8</td>
<td>45.5</td>
<td>44.3</td>
</tr>
<tr>
<td>Acres Harvested</td>
<td>45.3</td>
<td>46.4</td>
<td>47.3</td>
<td>43.8</td>
<td>37.6</td>
<td>39.6</td>
<td>37.4</td>
<td>36.7</td>
</tr>
<tr>
<td>% Harvested</td>
<td>80.6%</td>
<td>81.7%</td>
<td>86.0%</td>
<td>87.4%</td>
<td>81.6%</td>
<td>82.8%</td>
<td>82.2%</td>
<td>82.8%</td>
</tr>
<tr>
<td>Yield</td>
<td>47.1</td>
<td>43.7</td>
<td>43.6</td>
<td>52.7</td>
<td>46.4</td>
<td>47.6</td>
<td>51.7</td>
<td>49.7</td>
</tr>
<tr>
<td>Production</td>
<td>2,135</td>
<td>2,026</td>
<td>2,062</td>
<td>2,309</td>
<td>1,741</td>
<td>1,855</td>
<td>1,932</td>
<td>1,826</td>
</tr>
<tr>
<td>Total Supply</td>
<td>3,021</td>
<td>2,768</td>
<td>2,927</td>
<td>3,402</td>
<td>3,079</td>
<td>3,119</td>
<td>3,117</td>
<td>2,974</td>
</tr>
<tr>
<td>Food</td>
<td>951</td>
<td>958</td>
<td>957</td>
<td>949</td>
<td>964</td>
<td>955</td>
<td>962</td>
<td>965</td>
</tr>
<tr>
<td>Seed</td>
<td>77</td>
<td>79</td>
<td>67</td>
<td>61</td>
<td>63</td>
<td>59</td>
<td>60</td>
<td>62</td>
</tr>
<tr>
<td>Feed and Residual</td>
<td>228</td>
<td>114</td>
<td>149</td>
<td>160</td>
<td>51</td>
<td>90</td>
<td>101</td>
<td>100</td>
</tr>
<tr>
<td>Exports</td>
<td>1,176</td>
<td>864</td>
<td>778</td>
<td>1,051</td>
<td>901</td>
<td>936</td>
<td>965</td>
<td>985</td>
</tr>
<tr>
<td>Total Demand</td>
<td>2,432</td>
<td>2,015</td>
<td>1,951</td>
<td>2,222</td>
<td>1,980</td>
<td>2,039</td>
<td>2,089</td>
<td>2,112</td>
</tr>
<tr>
<td>Ending Stocks</td>
<td>590</td>
<td>752</td>
<td>976</td>
<td>1,181</td>
<td>1,099</td>
<td>1,080</td>
<td>1,028</td>
<td>862</td>
</tr>
<tr>
<td>Stocks to Use</td>
<td>24.26%</td>
<td>37.32%</td>
<td>50.03%</td>
<td>53.15%</td>
<td>55.51%</td>
<td>52.97%</td>
<td>49.21%</td>
<td>40.81%</td>
</tr>
<tr>
<td>Avg. Farm Price</td>
<td>$6.87</td>
<td>$5.99</td>
<td>$4.89</td>
<td>$3.89</td>
<td>$4.72</td>
<td>$5.16</td>
<td>$4.58</td>
<td>$4.70</td>
</tr>
</tbody>
</table>

Source: United States Department of Agriculture, World Outlook Board
in just $20 million below potato receipts—the 4th largest agricultural revenue stream for Washington farmers.

The increase in Washington harvested bushels in 2020 combined with the higher-than-average prices thus far in the marketing year suggests that Washington farmers’ total wheat revenue increased in 2020 compared to sales in 2019. However, if current market conditions prevail, Washington wheat prices will still be below total costs of production through the remainder of the marketing year (total costs include not only the variable costs of what production, but also farm fixed costs such as mortgages and equipment depreciation—costs that do not go away if wheat is not produced). Thus, Washington wheat farmers will continue to “finance” their operations through a decline in total equity this year.

U.S. wheat exports are critical to determining domestic wheat prices. Based on December 2020 USDA forecasts, total exports of wheat, as well as exports of White wheat, are expected to increase this marketing year compared to 2019/2020 (Figure 4). This is particularly critical for White wheat. On average, the U.S. exports a little over 50 percent of each year’s total wheat production. For the 2020/2021 marketing year, about 54 percent of 2020 production is expected to be exported. If we include the wheat left over from the previous year (the wheat stocks that were being held as we entered the 2020 harvest), about 33 percent of the total U.S. supply (which includes some imports) will be exported this marketing year. That being said, the majority of all White wheat produced in the U.S. is exported. For example, the USDA estimates, for the 2020/2021 marketing year, 71 percent of 2020 production and 53 percent of the total 2020/2021 supply will enter the export market, making Washington wheat farmers particularly vulnerable to disruptions in trade.

**Barley**

Total U.S. barley production in 2020 declined about 4 percent relative to 2019. This was the result of both lower acreage and a small reduction in average yields. Unfor-
Fortunately, the lower production is matched by an expected decrease in consumption for the 2020/2021 marketing year. The result is that the amount of barley expected to be left over going into the 2021 barley harvest is near the carryover stocks from May 31, 2020. Despite little change in the year-over-year carryout estimate, U.S. prices of barley this marketing year are expected to lag last year’s average price by about 3 percent.

In contrast to the national picture, Washington barley producers actually increased total production in 2020 compared to 2019. However, the increase came entirely from a year-over-year increase in yields. Planted acres actually declined in 2020 compared to 2019 by 5.5 percent, but Washington yields averaged 90 bushels per acre in 2020, compared to 70 bushels per acre in 2019. For perspective, the national average barley yield in 2020 was 77.5 bushels per acre. Figure 6 shows average barley yields in Washington over the last 40 years. The 2020 yields were truly phenomenal historically speaking.

In contrast to wheat prices, cash barley prices offered to Washington producers generally lag national average prices. Figure 7.A shows average historical feed-grade prices for Washington farmers compared to the national average prices for feed-grade barley. Through Fall 2020, Washington farmers faced larger price discounts relative to national average prices for feed-grade barley than they did in the previous 2 years.

Many Washington producers focus on malting barley, earning them a premium over prices shown in Figure 7.A.

**Figure 5: Washington Barley Acres and Production**

![Barley Acres and Production Chart](Source: United States Department of Agriculture, National Agricultural Statistics Service)

**Figure 6: Washington Barley Yields**

![Barley Yields Chart](Source: United States Department of Agriculture, National Agricultural Statistics Service)
On an annual average basis, Washington producers have done better than the national average, relative to the malt premium received over the feed barley price. Figure 8.B shows the annual average malt premiums over the last 5 years. In general, the premium for malting barley in Washington has been growing relative to the feed-barley prices for the last couple of years, while it has been shrinking at the national level. If national production continues to decline, premiums for Washington malt-quality barley could continue to grow.

Summary

The expectation is for marginal improvement in national wheat prices for the 2020/2021 marketing year, following a year-over-year price decline of almost 11 percent experienced last marketing year. However, the current outlook suggests prices are not likely to match levels received in the 2018/2019 marketing year.

Domestically, projected wheat stocks at the end of the current marketing year are encouraging from a price perspective, as are export expectations. However, U.S. producers continue to be hampered by record large world stocks, with little hope that the situation will change in the coming months.

Despite only a small predicted difference in the domestic balance sheet for barley overall, U.S. barley producers can expect prices to fall short of last marketing year’s (the supply of U.S. barley left over at the end of the marketing year is projected to be nearly identical to last year’s residual supply). As a result, most barley farmers (similar to wheat producers) will face prices for the 2020/2021 marketing year that do not match their total costs of production. This has been the case for the last few years, and will remain the case until there is some sort of disruption to world supplies.
WASHINGTON remains the single largest producer of apples, pears, and cherries in the nation. The 2020 Washington tree fruit outlook analyzes the production trends and market conditions.

Note that we use two different words to denote year. To denote production related numbers, we use year, indicating the year when most of the horticultural management took place and the year when the fruit was harvested. For example, we write “In 2019, Washington State total production was 3,800 thousand tons...” meaning the total production during months August throughout November of 2019 was 3,800 thousand tons. When stating sales figures, we use marketing season. For example, we write “During the marketing year 2019-2020, Red Delicious represented 20 percent...” This refers to apples that were harvested in September 2019 and were sold from harvest time until the end of the season in July 2020.

**Apples**

In 2019, Washington State total apple production was at 3,800 thousand tons, representing 69 percent of all total apple production in the United States at 5,509 thousand tons. In 2019, total Washington apple production was above the 10-year average (2009-2019) at 3,237 thousand tons, but below the 2014 record production at 3,825 thousand tons. During 2009-2019, yield per acre in Washington increased 30 percent, from 17 tons per acre in 2009 to 22 tons per acre in 2019. Similar to previous years, the 2019 yield per acre in Washington State was above the United States average at 19 tons per acre. During 2009-2019, apple-cultivated surface increased 12 percent from 153 thousand acres in 2009 to 172 thousand acres in 2019. In the same year, 75 percent of all Washington apple production was sold in the fresh market.

For marketing year 2019-2020, the Honeycrisp variety exhibits the highest price received by growers in Washington State. The Free on Board (FOB) price for Honeycrisp was $2,260/ton ($45.20/40-lb box). There were other apple varieties sold at prices closer or higher than Honeycrisp prices. For example, the price for the variety Envy was $2,054/ton ($41.07/40-lb box) and the price for the variety WA-38 (Cosmic Crisp®) was $3,641/ton ($72.81/40-lb box). These varieties exhibit textural and flavor attributes more

---

**Figure 1: Total Apple Production, United States and Washington State, 2009–2019**

![Graph showing total apple production in the United States and Washington State from 2009 to 2019.]

Source: United States Department of Agriculture, 2020

**Figure 2: FOB Price Comparison across the 10 Selected Apple Varieties, Washington State, 2010–2020**

![Graph showing FOB price comparison across ten selected apple varieties from 2010 to 2020.]

appealing to consumers, such as Honeycrisp (e.g., crisp in texture, optimal balance of sweetness and acid in flavor). It is still unclear if quantities or prices of the established apple varieties in the market (Honeycrisp, Gala, or Fuji) would increase, remain constant, or decrease, when these other varieties (WA-38 or Cosmic Crisp®) become available in the market in larger volumes.

In general, in year 2019-2020, prices received by growers for the main apple varieties in volume (e.g., Red Delicious, Gala, Fuji, Granny Smith, Honeycrisp, Golden Delicious, and Cripps Pink) decreased compared to prices received in 2018-2019. The decrease in prices ranged from 11 percent for Fuji to 33 percent for Golden Delicious apples.

In terms of variety mix, in 2019-2020, Gala represented 25 percent of the total volume of apples shipped, followed by Red Delicious at 20 percent, Fuji and Granny Smith at 13 percent, and Honeycrisp at 11 percent of the volume of apples shipped from Washington state. Compared to 2010-2011, the volume of Red Delicious apples shipped in 2019-2020 decreased by 22 percent, Gala increased by 49 percent, Fuji increased by 13 percent, Granny Smith increased by 30 percent, Honeycrisp increased by 437 percent, Golden Delicious decreased by 44 percent, and Cripps Pink increased by 92 percent.

WA-38 (Cosmic Crisp®) were available in the market as of December 2019. The volume of apples shipped for the 2019-2020 was at 6,919 tons (345,929 40-lb boxes). These apples sold at a record price of $3,641/ton ($72.81/40-lb box), which was 61 percent higher than the price for Honeycrisp at $2,260 /ton ($45.20 /40-lb box).

Maintaining a steady share in established export markets and an increasing share in emerging markets is crucial for the economic sustainability of the Washington apple industry. During the marketing season 2019-2020, Washington State exported 27 percent of the apples produced. The primary export destinations were Mexico (31 percent of total apple exports) and Canada (15 percent). The second largest export destinations were Asian countries: India (six percent), Taiwan (eight percent), China (two percent), Indonesia (three percent), Vietnam (five percent). The third block of important destinations were the Middle East with Dubai (two percent) and Saudi Arabia (three percent). Other destinations represent 22 percent of the total Washington apple exports.
Pears

Washington State remains the largest producer of pears by volume in the United States. In 2019, the total pear production in Washington State was at 330 thousand tons, representing 45 percent of total pear production in the United States at 729 thousand tons. In 2019, pear production in Washington was below the 10-year average, at 400.3 thousand tons. The production in 2019 was 17 percent lower than the production in 2018. In 2019, the cultivated surface in Washington decreased by one percent from 20,600 in 2018 to 20,400 in 2019. This area represents 45 percent of the total bearing acres for pears in the United States. Yield per acre in Washington, at 16.2 tons/acre, is above the national average at 16.1 tons/acre. The overall (both fresh and processed market) FOB price received by the grower was at $440/ton. Eighty percent of Washington State pear production went to the fresh market.

In 2019-2020, the most popular pear varieties grown in Washington State were D’Anjou with 57 percent of total production, followed by Bartlett with 29 percent, Bosc with...
Figure 6: Pear Variety Mix Evolution from 2009–2010 to 2019–2020, Washington State

Figure 7: FOB Price Comparison across the Four Top Pear Varieties, Washington State, 2010–2020

Figure 8: Washington Pear Exports Destination by Volume, from 2014–2015 to 2019–2020
FOB prices received by growers vary across varieties. For the most popular varieties (e.g., D’Anjou, Bartlett, and Bosc), prices have remained stagnant for the last 10 years. The 10-year average price for Bartlett is $1,159/ton, Bosc is $1,143/ton, and D’Anjou is $1,110/ton.

During the marketing season 2019-2020, Washington State exported 27 percent of the pears produced. Main export destinations were Mexico (59 percent of total pear exports) and Canada (18 percent). The second largest export destinations were the Middle East countries, with Israel (3 percent), Dubai (3 percent), and Saudi Arabia (1 percent). Then Latin American countries with Brazil (3 percent), Colombia (2 percent), Panama (2 percent), and Costa Rica (1 percent). Asian countries with India at 2 percent. Other destinations represent 7 percent of the total Washington pear exports.

Cherries

In 2019, Washington State was the largest producer, in volume, of sweet cherries in the United States with 67 percent of total production. The Washington total sweet cherry production in 2019 was at 239 thousand tons, two percent lower than 2018 production at 245 thousand tons. The Washington production volume in 2019 was higher than the 10-year average at 222.4 thousand tons and lower than the 2012 production peak at 264 thousand tons. Washington sweet cherry cultivated surface has seen a 14 percent increase during the last 10 years, from 35 thousand acres in 2009 to 40 thousand acres in 2019. From 2009-2019, the yield per acre decreased 15 percent from 7 tons per acre in 2009 to 5.97 tons per acre in 2019. The Washington State yield per acre was above the United States average yield per acre at 4.07 tons per acre for 2019. That year, 80 percent of all Washington State sweet cherry production was destined for the fresh market. The sweet cherry FOB price received by Washington growers was $1,900/ton, below the U.S. average at $2,160/ton.

As of 2020, the mix of sweet cherry varieties grown in the Northwest (comprising the states of Washington, Oregon, Idaho, Utah, and Montana) fluctuated. Fifty nine percent of all sweet cherries produced in the Northwest were represented by a large number of varieties. Yet the highest volume of all the varieties was Bing with 10 percent of total production and Sweethearts, with 9 percent of total production. These were followed by Skeenas with 8 percent, Rainier with 7 percent, and Chelan with 4 percent, and Lapin with 3 percent.

As of 2020, 38 percent of the total Northwest production of cherries was exported. The main destination was Canada with 38 percent of total volume exported, followed by China with 18 percent, Korea with 14 percent, Taiwan with 11 percent, Vietnam with 5 percent, Japan with 4 percent, and Hong Kong with 2 percent.
**Figure 9:** *Sweet Cherry Variety Mix Evolution from 2010–2020, Northwest States*

Source: Northwest Cherry Growers, 2020

**Figure 10:** *Northwest Sweet Cherry Exports Destination by Volume, from 2011–2020*

Source: Northwest Cherry Growers, 2020
UNDER Section 101 of the Specialty Crops Competitiveness Act of 2004 (7 U.S.C. 1621 and section 10010 of the Agricultural Act of 2014, Public Law 113-79) specialty crops are “fruits and vegetables, tree nuts, dried fruits, horticulture, and nursery crops (including floriculture).” As detailed below, specialty crops play an outsized role in the agricultural economy relative to their share of acreage. This is particularly true in what the USDA refers to as the “Fruitful Rim,” which includes Florida, Texas, and the West Coast from Arizona to Washington. Specialty crops also play a key role in making agriculture a more dynamic industry. Fresh market and direct sales provide opportunities for high margins, allowing new entrants into farming—operating at small scales—to be financially feasible. This section provides an overview of trends in specialty crop production and markets. For more background on specialty crop production in general, see the 2014 version of this report.

This section provides a detailed summary of prices and production of the major specialty crops in Washington State. The most recent information available is from 2019, and all information, excluding wine grapes, is derived from USDA National Agricultural Statistics Service sources. Wine production and price trends are provided by the Washington State Wine Commission (www.washingtonwine.org). Previous year data for specialty crops is generally available in late-winter to early spring.

The Big Story for Specialty Crops in 2019? Lots of variation.

There was no unified story across all specialty crops in 2019 relative to previous years. Wine grapes saw strong price growth, perhaps due to lower production (Figure 2). Potato production and prices were up significantly in 2019. Sweet corn prices were down in the fresh market in contrast to 2018, but the processing market saw slight gains. Because these values characterize the 2019 market, no effects of Covid-19 on supply or demand are reflected in these numbers.

Wine grapes

After a rebound in 2018, production of most white and red wine grape varietals dropped significantly in 2019 (Washington State Wine Commission). As is shown in Figure 3, White Riesling production is just half of what it was at its peak in 2014. Chardonnay is down about 10,000 tons from 2014. All of the major red varietals saw production drop in 2019, with Cabernet Sauvignon—the most produced grape in Washington—seeing the largest drop. On a more positive note, prices for nearly all reds and whites were up significantly in 2019, likely related to the contraction in supply.

Chardonnay and Sauvignon Blanc continue to command substantially higher prices than other white varieties. Among reds, Merlot has seen an impressive growth in price of more than 20 percent just since 2016. Cabernet Franc remains the most expensive red on a per unit basis with Cabernet Sauvignon in a close second.

The closure of restaurants in 2020 due to Covid-19 has raised the potential for a drop in demand for wine. More time is needed to see whether this is in fact true, or whether other sources of demand have made up the difference.

Figure 3: Wine Grape Production and Price Trends

![Figure 3: Wine Grape Production and Price Trends](image-url)
Vegetables

Table 1 reports production and Table 2 reports prices for major vegetables in Washington. There was no clear trend across vegetables in 2019. The most noteworthy trend was that potato prices were up by more than $1/cwt to $8.90/cwt in 2019 from $7.82/cwt in 2018. This occurred even with an approximate 5 percent increase in production. Potato production in 2019 was the second highest total since 2010. Sweet corn sold in the fresh market was up substantially in 2019, while the processing market was down modestly. Fresh market prices were down nearly half from 2018. Asparagus and onion production and prices held steady from 2018 to 2019. Green peas saw a rebound in both production and price.

Berries

Blueberry production in Washington continued its explosive growth in 2019 with production reaching 163 million

### Table 1: Vegetable production

<table>
<thead>
<tr>
<th>Year</th>
<th>Asparagus (cwt)</th>
<th>Onions (cwt)</th>
<th>Green peas (cwt)</th>
<th>Potatoes (cwt)</th>
<th>Sweet corn, fresh (cwt)</th>
<th>Sweet corn, processing (cwt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>228,000</td>
<td></td>
<td></td>
<td>88,440,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>220,000</td>
<td></td>
<td></td>
<td>97,600,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>202,000</td>
<td></td>
<td></td>
<td>95,940,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>188,000</td>
<td></td>
<td></td>
<td>96,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>182,000</td>
<td></td>
<td></td>
<td>101,475,000</td>
<td>1,817,000</td>
<td>693,000</td>
</tr>
<tr>
<td>2015</td>
<td>167,000</td>
<td></td>
<td></td>
<td>108,000,000</td>
<td>3,441,000</td>
<td>722,000</td>
</tr>
<tr>
<td>2016</td>
<td>211,000</td>
<td>18,053,000</td>
<td>1,855,000</td>
<td>105,625,000</td>
<td>524,000</td>
<td>909,000</td>
</tr>
<tr>
<td>2017</td>
<td>232,200</td>
<td>15,894,000</td>
<td>1,528,100</td>
<td>99,220,000</td>
<td>808,000</td>
<td>734,000</td>
</tr>
<tr>
<td>2018</td>
<td>267,000</td>
<td>17,301,000</td>
<td>1,782,000</td>
<td>100,800,000</td>
<td>447,000</td>
<td>806,000</td>
</tr>
<tr>
<td>2019</td>
<td>226,000</td>
<td>14,328,000</td>
<td>1,906,000</td>
<td>104,960,000</td>
<td>630,000</td>
<td>756,000</td>
</tr>
</tbody>
</table>

### Table 2: Vegetable prices

<table>
<thead>
<tr>
<th>Year</th>
<th>Asparagus (cwt)</th>
<th>Onions (cwt)</th>
<th>Green peas (cwt)</th>
<th>Potatoes (cwt)</th>
<th>Sweet corn, fresh (cwt)</th>
<th>Sweet corn, processing (cwt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>77.14</td>
<td></td>
<td></td>
<td>7.40</td>
<td>38.80</td>
<td>79.80</td>
</tr>
<tr>
<td>2011</td>
<td>78.90</td>
<td></td>
<td></td>
<td>7.90</td>
<td>41.00</td>
<td>109.04</td>
</tr>
<tr>
<td>2012</td>
<td>90.00</td>
<td></td>
<td></td>
<td>7.30</td>
<td>33.00</td>
<td>113.27</td>
</tr>
<tr>
<td>2013</td>
<td>95.06</td>
<td></td>
<td></td>
<td>8.25</td>
<td>37.00</td>
<td>121.49</td>
</tr>
<tr>
<td>2014</td>
<td>75.39</td>
<td></td>
<td></td>
<td>7.60</td>
<td>27.00</td>
<td>107.84</td>
</tr>
<tr>
<td>2015</td>
<td>93.32</td>
<td></td>
<td></td>
<td>7.70</td>
<td>6.30</td>
<td>105.65</td>
</tr>
<tr>
<td>2016</td>
<td>88.30</td>
<td>10.29</td>
<td>17.09</td>
<td>7.70</td>
<td>24.40</td>
<td>100.00</td>
</tr>
<tr>
<td>2017</td>
<td>101.40</td>
<td>8.15</td>
<td>15.63</td>
<td>6.92</td>
<td>35.50</td>
<td>90.00</td>
</tr>
<tr>
<td>2018</td>
<td>98.11</td>
<td>10.27</td>
<td>12.78</td>
<td>7.82</td>
<td>64.18</td>
<td>79.97</td>
</tr>
<tr>
<td>2019</td>
<td>93.99</td>
<td>12.60</td>
<td>15.82</td>
<td>8.90</td>
<td>34.20</td>
<td>85.00</td>
</tr>
</tbody>
</table>
pounds. This represents a nearly 50 million pound or 40 percent increase in just two years. This was, up from 117 million in 2017. This huge increase in production was associated with only a slight drop in price from $1.02/pound to $0.94/pound. The blueberry crop in Washington was worth $153 million in 2019. Harvested blueberry acreage reached 16,700 acres in 2019, which was up from 14,400 acres in 2018.

Red raspberry production (82 million pounds) was up 7 percent year-over-year in 2019, while acreage was down 300 acres to 9,200 acres in 2019. The value of the raspberry crop rebounded significantly to $46 million. This follows a substantial drop from 2017 ($58 million) to 2018 ($35 million). Prices continue their slide that started a few years back. Raspberry prices remained relatively low in 2019 at $0.56/pound. In comparison, they reached $1.22/lb in 2015. Due to disclosure requirements, USDA did not report updated statistics for strawberries in 2019.

**Hops**

After years of remarkable growth through 2017, hop production rebounded slightly after a small drop in 2018 to 82 million pounds in 2019. Hop acreage increased slightly to 40,900 acres from 39,200 acres in 2018. The value of the hop crop in 2019 was up a healthy margin at $475 million—a $50 million increase from 2018. This follows a drop from $459 million in 2017 to $428 million in 2018. The 2019 unit price of $5.80/pound is the median value observed over the last decade.

**Mint**

Mint production, acres harvested, and prices were largely unchanged in 2019 relative to 2018. Production totaled 1.3 and 1.6 million pounds for peppermint and spearmint respectively, for a combined total of 21,000 acres. The total value of the mint crop was $53 million.

**Organic**

Organic farming continued its explosive growth in 2019 reaching 142,000 certified organic acres in Washington, despite having just crossed the 100,000 mark in 2016. The number of organic farms continues to increase, reaching over 1,000 for the first time. Organic apple production continues to grow, albeit at a slower rate than was observed from 2016 to 2018. Organic vegetable acres actually decreased slightly in 2019 primarily due to a drop in sweet corn. Potatoes saw some growth, whereas other crops like carrots, onions, and snap beans remained unchanged. The most up to date summaries of trends in organic agriculture are provided by the Center for Sustaining Agriculture and Natural Resources (CSANR) at Washington State University http://csanr.wsu.edu/trends-in-washington-agriculture/organic-statistics/.
The beef cattle market in 2020 has been characterized by a response to and recovery from two Black Swan events, both of which were supply chain disruptions. The first occurred when the Tyson Fresh Meats (Tyson) beef packing plant in Holcomb, Kansas closed for four months following a fire at the facility on August 9, 2019, which disrupted processing systems and markets. The plant accounted for approximately five to six percent of the nation’s beef processing capacity. As the beef sector was recovering from the Tyson plant fire, the second event occurred as Covid-19 spread to the U.S. in winter 2020. The pandemic caused some beef cattle packing plant closures such as the JBS plant in Colorado and National Beef Packing Company in Iowa. In addition to closures, Covid-19 production protocols and higher worker absenteeism slowed down most plants’ operation speed. The Covid-19 supply chain disruption due to the decrease in cattle slaughter is presented in Figure 1. The figure presents total U.S. slaughter rates because data specific to Washington will not be available until 2021. Figure 1 shows at the start of the year, slaughter rates reflected record high beef production levels with cattle slaughter well above 2019 slaughter rates. The Covid-19 supply disruption shock started in April and May with recovery to 2019 levels starting in July and extending to October, the latest month of available data. In Washington the spring Covid-19 outbreak resulted in a short shut down of the Tyson plant in Wallula to conduct employee Covid-19 testing and implement protocols. Both the Tyson plant and the Washington Beef plant in Toppenish reduced slaughter rates to accommodate Covid-19 social distancing and personal protective equipment protocols. In response to reduced commercial slaughter capacity some cattle feeders sold finished cattle.

Figure 1: Federally Inspected Cattle Slaughter Reduction Due to COVID-19 (daily average by month)

<table>
<thead>
<tr>
<th>Month</th>
<th>Avg. 2014–18</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>90</td>
<td>100</td>
<td>110</td>
</tr>
<tr>
<td>Feb</td>
<td>110</td>
<td>120</td>
<td>130</td>
</tr>
<tr>
<td>Mar</td>
<td>130</td>
<td>140</td>
<td>150</td>
</tr>
<tr>
<td>Apr</td>
<td>150</td>
<td>160</td>
<td>170</td>
</tr>
<tr>
<td>May</td>
<td>170</td>
<td>180</td>
<td>190</td>
</tr>
<tr>
<td>Jun</td>
<td>190</td>
<td>200</td>
<td>210</td>
</tr>
<tr>
<td>Jul</td>
<td>210</td>
<td>220</td>
<td>230</td>
</tr>
<tr>
<td>Aug</td>
<td>230</td>
<td>240</td>
<td>250</td>
</tr>
<tr>
<td>Sep</td>
<td>250</td>
<td>260</td>
<td>270</td>
</tr>
<tr>
<td>Oct</td>
<td>270</td>
<td>280</td>
<td>290</td>
</tr>
<tr>
<td>Nov</td>
<td>290</td>
<td>300</td>
<td>310</td>
</tr>
<tr>
<td>Dec</td>
<td>310</td>
<td>320</td>
<td>330</td>
</tr>
</tbody>
</table>

Source:
privately through state custom exempt regulations that flooded private cattle butchers to slaughter and process cattle. The Washington State Department of Agriculture established the Meat Processor Pandemic Relief Grant Program using funds from the Covid-19 CARES Act to help meat processors with 250 or fewer employees cover costs of improving infrastructure and operating capacity in response to the coronavirus pandemic.

As free markets function, the supply shock shortage resulted in record high wholesale and retail beef prices. In the weeks and months after both the fire and Covid-19 events, the difference – or price spread – between the Choice boxed beef cutout values and dressed fed cattle prices rose to records levels. Figure 2 presents the monthly price spread from 2019 to November 2020 highlighting the months affected by the Holcomb plant fire and Covid-19 with select month data labels. The average price spread excluding the two black swan events is about $103 per hundred weight or cwt. While the Holcomb Tyson plant was shut down due to the 2019 fire, the price spread increased to as much as $124 per cwt. The price spread due to Covid-19 reached as high as $306 per cwt in May. The supply shortage impacted local markets. Figure 3 shows an empty beef meat case at a Pullman grocery store over the Memorial Day weekend illustrating the extent of the supply shock.
Due to the record increase in the price spread, some claim that meat packers violated the Packers and Stockyards Act by taking advantage of their concentrated market power through price manipulation, collusion, restrictions of competition, or other unfair practices. The four largest U.S. meat packers collectively control about 85 percent of the U.S. beef slaughter and processing market. Some cattle feeders have claimed that meat packers have not competitively purchased cattle so as to pass back the increase in cutout value. About 70 percent of the finished feedlot cattle in the U.S. are purchased through some form of prearranged contract, with a price set by a formula using cash market transactions. However, with the increased use of contracts, the number of cattle sold through the cash market has decreased, leading to claims of inadequate price discovery in the cattle markets. This harms cattle producers by reducing market competition, which, in turn, decreases cattle prices. To address cattle market concerns, three different federal bills have been proposed called the 50-14 rule, the Cattle Transparency Bill, and the PRICE Act. The cattle industry has long been opposed to government regulation that could distort market signals, and has recently advocated for greater industry commitment in order to purchase in cash markets through the 75% rule. The 75% rule is a voluntary framework that includes regional cattle feeder and packing plant triggers based on levels of marketplace participation. The objective is to increase the frequency and price transparency in all major cattle feeding regions. Washington is not directly incorporated in the 75% rule as the proposed regions are defined to be the large cattle feeding areas in the Midwest. Due to competitive factors in the Mandatory Livestock Reporting Act, Washington data is not publicly reported. The resolution of the proposed market actions will not occur until 2021. The net impacts to Washington’s cattle feeding and beef packing sectors are not expected to be large because Washington’s market is not directly measured in the 75% rule. In contrast, the Texas area is expected to be impacted the most: it has the highest use of contracts marketed by taking the January 1 USDA cattle on feed inventory by state and multiplying by 2, reflecting a typical 180 day feeding period with an inventory turnover of two. The inventory data shows that Washington mirrors national inventory trends.

U.S. and PNW Beef Production Review

The Covid-19 contracted slaughter rates previously presented in Figure 1 will have carryover impacts into 2021. As cattle slaughter rates decreased, it increased the number of days cattle remained in feedlots and reduced the placement of feeder cattle into feedlots. This combination means the supply of beef in the first half of 2021 will continue to set a year-over-year record of increasing supply. The price effects on the expanded beef supply will depend on Covid-19 economic recovery and its associated food service demand; historically, dine in restaurants were a major demand for beef.

Industry metrics in 2020 for beef heifer, cow slaughter, and cow-calf producer profitability indexes show that the expansion growth of U.S. beef cow inventory has ended, and that cow herd liquidation has started. Washington mirrors this trend with its cow herd peaking in 2018 at 235,000 head, decreasing to 230,000 head in 2019, and 228,000 head in 2020. Washington’s beef cattle inventory is presented in Figure 4. The projected feedlot inventory has shown growth over the past three years reaching an estimated 480,000 head fed in 2020. The cattle on feed number estimates the annual number of feedlot cattle marketed by state and multiplying by 2, reflecting a typical 180 day feeding period with an inventory turnover of two. The inventory data shows that Washington mirrors national inventory trends.

Figure 4: Washington Beef Cattle Inventory
Price Trend

Washington auction prices for calves sold during the spring Covid-19 market shock saw a price decrease of about 8 percent compared to 2019 prices. Figure 5 shows monthly auction prices for steers weighing 500 to 600 pounds (the typical sale weight for cow-calf producers). Steer prices in 2020 for January and February were above 2019 prices. 2020 prices fell below 2019 prices for March, April and May and then closely matched 2019 prices for the remainder of the year. For weaned calves, October is the primary marketing month for the majority of Washington cow-calf producers. The October steer price is isolated and shown in Figure 6. The October 2020 price at $144 per cwt is slightly below the 2019 price of $147 per cwt and shows a third year of declining price trend. At the start of 2020, futures market contract prices for October feeder cattle were about $14 higher than actual, indicating there was potential for risk management using either futures contracts or the USDA Livestock Risk Protection program to be effective. Prices for Washington finished feedlot cattle and slaughter plant meat prices are not publicly available because USDA has competitive non-disclosure policies when there are few producers.

Cattle producers also sell cull cows whose price is also presented in Figure 6. Cull cows are a significant source of revenue for cattle producers and culls typically represent 15 to 20 percent of total revenue. Cull cow price has been relatively stable compared to recent years, though in a declining trend. Cull cow prices declined to $62 in 2020, only $2 per cwt below 2018 and 2019 prices that were both $64 per cwt. Washington cull cow prices have not seen a price benefit from increasing cull cow slaughter capacity from the CS Beef Packers that started operations in June, 2017. The USDA reports cull cow slaughter data by regions. Our region combines Washington, Idaho, Oregon and Alaska. Prior to the plant opening, the number of cows slaughtered was relatively stable, staying below 250,000 head in the region. Cull cow processing, combining both dairy and beef cattle, was increased to 639,800 in 2019. In 2020, processing is at 602,700 from January through November. The overall rate of cull cow slaughter has not been impacted by Covid-19.

Cattle producers were eligible to receive payments from the Coronavirus Food Assistance Program. Payments to Washington livestock producers totaled $26 million for CFAP 1 and $11.3 as of December, 5 for CFAP 2. Livestock producer payments do not include the payments for dairy production.
Summary Review and 2021 Outlook

The start of 2020 was optimistic for improved cattle market prices due to completion of the Phase 1 Trade Agreement with China, completion of the USMCA Trade agreement, and the U.S. and Japan bilateral trade agreement. Expansion of exports was seen as critical to help markets clear projected record high beef production. At the end of February 2020, beef exports by volume were up by 10 percent and value up by 11 percent over 2019 exports. At the end of May, Covid-19 slowed beef exports, and export volume and value were down -3 percent and -5 percent respectively. At the end of October, exports remain below 2019 levels, with a decrease of -7 percent in volume and -8 percent in value. Mexico—our third largest beef market following Japan and Korea—led the decrease in exports. Decreased beef exports to Mexico was -27 percent in volume and -32 percent in value. Pork exports to Mexico also decreased, though not as much as beef exports. Exports remain essential to future price strength. The demand for U.S. beef in Japan and Korea continues to be stable. Regaining exports to Mexico will depend on economic recovery from Covid-19 and the redevelopment of the tourism segment of Mexico’s economy. Analysts are optimistic for beef demand growth in China. Beef exports to China in 2020 grew dramatically by percent change, but that was primarily due to low, but upward trending beef export levels. The Phase 1 trade agreement reduced non-tariff trade barriers concerning zero tolerance of growth hormones, accepted the U.S. traceability system, eliminated its ban on beef from slaughtered cattle over 30 months of age, and increased the number of U.S. beef plants inspected and authorized to export to China. China’s retaliatory tariffs on beef remain in effect, but future negotiations are hopeful to eliminate or reduce the tariffs. Developing export markets requires long-term strategy, and industry analysts are hopeful that China will become a top 3 export market due to its large population and economy.

There is also optimism for 2021 beef markets domestically. Once the backlog of feedlot cattle are slaughtered, future production levels are expected to moderate. The decreasing inventory of beef cows is expected to reduce supply and support future prices. The demand for U.S. beef in Japan and Korea continues to be stable. Regaining exports to Mexico will depend on economic recovery from Covid-19 and the redevelopment of the tourism segment of Mexico’s economy. Analysts are optimistic for beef demand growth in China. Beef exports to China in 2020 grew dramatically by percent change, but that was primarily due to low, but upward trending beef export levels. The Phase 1 trade agreement reduced non-tariff trade barriers concerning zero tolerance of growth hormones, accepted the U.S. traceability system, eliminated its ban on beef from slaughtered cattle over 30 months of age, and increased the number of U.S. beef plants inspected and authorized to export to China. China’s retaliatory tariffs on beef remain in effect, but future negotiations are hopeful to eliminate or reduce the tariffs. Developing export markets requires long-term strategy, and industry analysts are hopeful that China will become a top 3 export market due to its large population and economy.

Phase 1 trade agreement reduced non-tariff trade barriers concerning zero tolerance of growth hormones, accepted the U.S. traceability system, eliminated its ban on beef from slaughtered cattle over 30 months of age, and increased the number of U.S. beef plants inspected and authorized to export to China. China’s retaliatory tariffs on beef remain in effect, but future negotiations are hopeful to eliminate or reduce the tariffs. Developing export markets requires long-term strategy, and industry analysts are hopeful that China will become a top 3 export market due to its large population and economy.

There is also optimism for 2021 beef markets domestically. Once the backlog of feedlot cattle are slaughtered, future production levels are expected to moderate. The decreasing inventory of beef cows is expected to reduce supply and support future prices. Decreasing cow inventory is expected for 2021 as major cattle production areas in the Southwest had drought conditions through the end of 2020—climate forecasters expect the ongoing La Nina weather pattern to negatively impact pasture conditions through the Southwest and Midwest major cattle production areas. This has helped Northwest cattle producers in the past because of improved market prices, with limited effects on pasture conditions. Much of the beef industry outlook depends on the post-pandemic recovery of the economy. While U.S. consumers increased beef consumption at home through the pandemic, the industry is anticipating a sharp demand boost from food service when travel and dine-in Covid-19 restrictions are lifted.
Dairy markets may have had the most challenging COVID-19 market impacts across agricultural commodities because of milk's high perishability and almost daily market delivery that limits the dairy product market's ability to adapt to changes in distribution channel shocks. In addition, dairy farms could not reduce production costs in response to pandemic market shocks because of labor costs—dairy cows still needed to be fed, milked and have their health maintained. Unfortunately, the pandemic market effects disrupted a brief dairy economic recovery from the end of 2019: the first two months of 2020 saw milk prices improve to their highest levels since 2014. This brief recovery was particularly welcome following the protracted period from 2015 to 2019 of low milk prices, low dairy profitability, and an increasing number of dairy farms exiting the industry. The Covid-19 market impacts are illustrated in Figure 1 showing monthly prices for butter and cheese.

Cheese prices for both 40 pound blocks and 500 pound barrels had an increasing price trend throughout 2019, peaking in late fall. Butter and cheese prices then decreased dramatically in the first quarter of 2020 as the impact of COVID-19 shocked the market and dramatic measures were taken to contain the spread of the virus. Restaurants and schools were shut down along with other non-essential businesses. This resulted in a significant depression in the food service industry, prompting the closing of many venues that utilized large amounts of cheese blocks and barrels and other bulk packaged dairy products. Consumer demand at the retail level increased as families stayed at home in adherence to Covid-19 guidelines, but the logistics of converting dairy packaging from food service to consumer retail disrupted the supply chain, forcing butter and cheese prices to hit a record low in April 2020.

Cheese price recovery was swift in June and July, primarily supported by the positive demand shock from the USDA.

Figure 1: Chicago Mercantile Exchange Butter and Cheese Price

Farmers to Families Food Box program that resulted in a strong shift in demand and much improved prices for cheese and milk. Through this program, USDA’s Agricultural Marketing Service partnered with national, regional and local distributors to purchase up to $4.5 billion in fresh produce, dairy and meat products. Distributors packaged these products into family-sized boxes, then transported them to food banks, community and faith-based organizations, and other non-profits serving Americans in need. The supply of fresh cheese became tight and cheese prices increased dramatically. The first food box program ended in mid-July, causing cheese prices to decrease sharply. The second round of government purchasing for the Food Box program took place in early September, once again boosting cheese prices higher due to a strong demand for fresh cheese. The USDA announced contracts for the third round on Sept. 17, 2020, and has purchased more than $3.634 billion worth of food to date. The upcoming fourth round, announced on Oct. 23, 2020, aims to purchase up to $500 million worth of food and will begin Nov. 1 with deliveries through Dec. 31, 2020.

While cheese prices were supported by the Food Box Program, butter prices trended downward throughout 2020. While Americans greatly increased cooking and baking—which should have supported butter prices—the data shows depressed butter prices. The primary drag on butter prices are high stocks. Monthly butter stocks averaged 20 percent higher in 2020 over 2019. Cheese and butter markets exert a strong effect on the milk prices Washington dairy farms receive. The Pacific Northwest Milk Marketing Order covers Washington and eastern Oregon dairy production. The Order’s milk utilization is illustrated in Figure 2. The Order’s predominant milk utilization is in Class IV milk, 42 percent, predominately used in butter production, followed by Class III milk, 30 percent, predominately used in cheese production. This milk utilization produces dry and skim milk powders and whey as primary byproducts. Despite Covid-19, exports of milk powders volume increased in 2020 by 14 percent from January through September due to increased demand from South East Asia; whey exports increased by 19 percent. China substantially increased U.S. whey imports in 2020 by about 94 percent compared to 2019, as they are feeding whey to their growing swine herd, rebuilding it following the African Swine Fever depopulation.

**Figure 2: Pacific Northwest Milk Utilization**

![Diagram of milk utilization showing:
- Class I Fluid Milk, 22%
- Class II Yogurt, Ice Cream, Sour Cream, 6%
- Class III Cheese, 30%


Washington Milk Price, Profitability and Cow Inventory

The cumulation of Covid-19 impacts and exports are represented in the milk price received by Washington dairy farmers. The monthly Washington milk price dairy farmers received from 2014 up through September 2020 is presented in Figure 3. Milk price received in the second half of 2019 and the first two months of 2020 were the strongest since 2014. Although prices dropped to dramatic lows in March, prices in the following months recovered. The 2020 January-September monthly average price is $17.10, which, despite Covid-19 impacts, is above prices received in 2016 and 2018. Reflecting improved 2019 milk prices, dairy farm profitability in 2019 was second only to the record high profits received in 2014. The year ending 2019 net income per milking cow for well managed Pacific Northwest dairies was $32.10 per cow. In comparison, the first six months of 2020 indicated a loss of -$7.53 per milking cow. (Frazer, Dairy Farm Operating Trends, https://frazerllp.com/wp-content/uploads/2020/11/06.30.20-Dairy-Operating-Trends.pdf).

The number of dairy cows in Washington has increased slightly from 275,000 in 2018, 280,000 in 2019 and 282,000 in 2020 based on January 1 USDA inventory estimates of dairy cow inventory. Despite Covid-19 challenges, Washington’s monthly milk production continues its year-over-year production trend increase, as shown in Figure 4. The data year to date in October has a small relative
Figure 3: *Washington Monthly Milk Price*

![Graph showing Washington Monthly Milk Price from 2014 to 2020 with various averages and years marked.]

Source: Author using USDA Quick Stats

Figure 4: *Washington Monthly Milk Production*

![Graph showing Washington Monthly Milk Production from January 2015 to December 2019 with different years marked.]

Source: Author using USDA Quick Stats data
increase of 41 million pounds of milk production in 2020 versus 2019. Milk production exceeded 2019 at the start of the year as producers responded to higher milk prices at the start of the year, but slowed to below 2019 monthly production levels from May through October. While the dairy market distribution chain was strongly impacted by Covid-19, the Washington supply of milk impact from Covid-19 was small.

Washington dairies mirror the national trend of dairies exiting the industry. The number of Washington dairy farms have declined from 367 in 2015 to 282 as of August in 2020, representing a decrease of 23 percent from 2015.

**Government Support for Dairy**

To help producers address Covid-19 impact, the USDA developed and administered several support programs that benefited dairy producers nationally and in Washington. The Coronavirus Food Assistance Program (CFAP) was developed to provide direct financial assistance. Two rounds of CFAP payments were made in 2020. For dairy, the CFAP 1 program benefited enrolled producers and offered compensation for the first quarter January to March losses, based on a producer’s certification of milk production. Payments for the first quarter were $6.18 per hundredweight of production, subject to a $250,000 payment limit. Dairy also qualified for the most recent rollout of CFAP 2 that pays $1.20 per cwt to dairy producers for the sum of milk produced from April 1-December 31, 2020. The CFAP 2 also had a payment limit of $250,000 per person that was separate from the CFAP 1 payment limit. Table 1 presents government support outlays that helped dairy producers address Covid-19 risks nationally and allocated to Washington.

The CFAP 1 program transferred almost $50 million to Washington dairy producers and about $17 million to date for CFAP 2 payments. The Dairy Margin Coverage (DMC) program and Dairy Revenue Protection (DRP) programs are risk management tools that triggered as Covid-19 impacted dairy markets. Washington dairies received $3.7 million from DMC and $8.8 million from DRP in financial support through these programs. To date, these programs combined total $79.6 million in additional revenue received in Washington to support dairy producers. As discussed previously, the Farmers to Food Box program substantially supported milk prices by purchasing dairy commodities for distribution to families. There is also a program called Section 32 that purchases dairy products. Dairies also qualified for the Paycheck Protection Program. Data on state expenditures are not provided for these programs. Based

---

**Table 1: Federal Dairy Support Program Payments**

<table>
<thead>
<tr>
<th>Program</th>
<th>National (million dollars $)</th>
<th>Washington (dollars $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFAP 1¹</td>
<td>$1,773</td>
<td>$49,995,026</td>
</tr>
<tr>
<td>CFAP 2²</td>
<td>$1,057</td>
<td>$17,108,074</td>
</tr>
<tr>
<td>Dairy Margin Coverage³</td>
<td>$200</td>
<td>$3,675,327</td>
</tr>
<tr>
<td>Dairy Revenue Protection⁴,⁵</td>
<td>$291</td>
<td>$8,847,092</td>
</tr>
<tr>
<td>Farmers to Families Food Box</td>
<td>$1,250</td>
<td>no data</td>
</tr>
<tr>
<td>Section 32 Dairy Purchases</td>
<td>$610</td>
<td>no data</td>
</tr>
<tr>
<td>Paycheck Protection Program</td>
<td>no data</td>
<td>no data</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$5,181</td>
<td>$79,625,519</td>
</tr>
</tbody>
</table>

¹ https://www.farmers.gov/cfap1/data  
² https://www.farmers.gov/cfap/data  
⁵ Dairy Revenue Protection is indemnity payment – producer premium payment + insurance premium subsidy
on available data about $5.1 billion was spent nationally on supporting dairy producers.

World Supply and Exports

The start of 2020 had positive expectations for improved U.S. dairy exports as a result of the Phase I Trade Agreement with China and completion of the USMCA Trade agreement. The Phase I trade agreement made progress for regulatory restrictions and non-tariff trade barriers on U.S. dairy products. The agreement did not address reducing China’s retaliatory tariffs on U.S. Dairy products that disadvantaged the U.S. industry compared to international competition. However, in March 2020, China permanently exempted U.S. dry whey from Chinese tariffs that became effective in September. Total whey exports to China in 2020 to date increased by almost double in 2020 over 2019. While this is a dramatic increase, it is important to note that exports to China in 2019 were low due to the retaliatory trade war prior to the Phase 1 agreement. Whey is used as a swine feed ingredient and Chinese demand is growing as they rebuild their swine herd after being significantly depopulated by the African Swine Fever.

The second major trade factor expected to bolster dairy exports was the completion of the U.S, Mexico and Canada trade agreement. Mexico is the leading export market for dairy products followed by Southeast Asia, Canada and China. Year to date value of total dairy exports to Mexico in 2020 have fallen by 6 percent; to Southeast Asia, have increased by 53 percent; to Canada, increased by 2 percent; exports of total dairy value to China have increased by 40 percent. Dairy exports have overcome Covid-19 marketing challenges and are on pace to match the record export volume seen in 2018 (https://www.usdec.org/research-and-data/market-information/us-export-data). Overall world dairy production in 2020 is expected to increase only slightly above 2019 by only 4 million tons—1 percent—indicating no major market impact due to changes in world dairy supply.

Dairy Outlook for 2021

Looking forward to 2021, milk production across the U.S. is expected to increase. One indicator of increased production is the decline in dairy cow slaughter numbers in 2020. Dairy cow slaughter has been below those of a year ago in every month of 2020 except March, dipping in August to a three year low for that month. Overall, dairy cow slaughter is 5 percent below 2019 levels year to date (January-September) in monthly slaughter data. Lower slaughter supports a higher average number of dairy cows remaining in the herd. October monthly Milk Production showed U.S. dairy cow inventory at 9.366 million head, 0.03 percent above a year ago or 30 thousand head.

Dairy farmers have been supported by government payments this year, but face continued pressure as the U.S. faces a protracted recovery from the Covid-19 pandemic. Washington continues to decrease the number of dairy farms that were either unable to financially survive or accelerated their liquidation decision. The overwhelming concern is the demand profile heading into next year. Food service and hospitality sectors are facing a second major decrease in business volume as Covid-19 restrictions are required to address the winter increase in Covid-19 cases. Food service firms are expected to have a slow recovery that likely will not look “normal” until late 2021 or 2022. This creates an uphill battle for the dairy sector whose retail sales will be challenged to offset production gains. The U.S. and global economy will need to recover in order to create a more stable and certain outlook. A third U.S. stimulus will likely be necessary to address high unemployment and food insecurity. A bright spot to recognize is the value of dairy products in providing nutrition as a staple in food at home cooking and consumption. Hopefully increased U.S. dairy consumption is a sustained demand shift in a post Covid-19 economy.
A NEMIC housing starts, impacts from a disastrous 2017 fire season, a trade war with China, and beetle-killed timber from Europe flooding global markets weighed heavily on Washington's forestry sector in 2019, but the outlook seemed to be improving in late 2019 with a growing domestic economy and the trade war with China approaching resolution. Then, 2020 happened. Initial reactions to the pandemic substantially curtailed production. But with more people working from home and spending less on travel and dining, home improvement boomed, catching the industry by surprise, from production through distribution. Shortages arose and prices soared.

Washington State's total timber harvest, including all public and private ownership, had been fairly flat for a few years, dropping in 2018 due to access issues created by larger and more numerous wildfires during the prior season. The downward trend continued in 2019 as the trade war with China cut Washington's log exports by half (more on this later). Fortunately, lumber production in the state continued to rise, absorbing some of the lost log exports (Fig. 1).

(Regarding Fig. 1, please note that logs are measured in board feet Scribner, which is not the same as the board feet measure used for lumber. Roughly, there may be about two board feet of lumber produced from a Scribner board foot of logs (referred to as “overrun”), which explains why there can be more lumber volume than log volume shown in Fig. 1, although there is waste in the lumber production process and not all logs harvested are used for lumber. We also note, and apologize, that the descriptions in Fig. 1 were switched in last year’s article somewhere between authorship and publication. The graph shown here is labeled correctly.)

Timber harvest trends by ownership (large and small private, State, and USFS) can be seen more clearly with quarterly data in Fig. 2. The drop in harvests was particularly acute for large private owners in the second and third quarters of 2018, recovering somewhat by the first half of 2019 but sliding again in the second half as the trade war intensified and log exports slowed. Note that the impact of economic disruption and uncertainty over the past three years has had the largest impact on small landowners, who appear to be suspending harvests until there is more clarity about the future.

Lumber production in the West (which is primarily Washington and Oregon) has been stable (Fig. 3), with increases...
**Figure 2:** Washington State Quarterly Timber Harvests by Ownership

- Private large
- Private small
- State
- USFS

Source: Washington State Department of Revenue

**Figure 3:** Western Lumber Production (monthly – January 2018 through October 2020)

- Inland
- Coastal

Source: Western Wood Products Association
in Washington offsetting a drop of 272 million board feet in Oregon’s 2019 production.

As 2019 came to a close, an end to the U.S.-China trade war was on the horizon. But no sooner was the “Phase One” deal with China announced when COVID arrived to spoil the party. Originally, the pandemic was expected to quash demand for building products. However, as anyone knows who has purchased lumber or plywood/OSB during the pandemic, it had quite a different effect, as described across several issues of the industry publication Random Lengths:

Amid lockdowns of some cities and areas, as the virus spread, building activity stalled and wood products prices plummeted…amid what appeared to be a complete derailment of the housing market and economy. (Random Lengths, June 5, 2020)

While housing starts appear to have bottomed in April, they are still well below the late 2019-early 2020 trend. Offsetting this loss of demand has been a major shift to the do-it-yourself lumber sector, as consumers staying close to home have used money they have saved from not traveling, commuting, and other COVID-related restrictions, to do home improvements. (Random Lengths, July 17, 2020)

Traders note that 2018 was driven by tight log supplies on the heels of a severe 2017 fire season in Western Canada and the Pacific Northwest, as well as a number of transportation issues that severely delayed shipments of lumber to the marketplace in early 2018. This year’s 2020 supply issue largely resulted from massive mill shutdowns amid the virus outbreak that overshot actual demand in housing and the developing surge in the home center market. (Random Lengths, July 17, 2020)

One reason cited…for the inability to increase output is the $600 monthly aid supplied by the federal government in addition to state-level unemployment benefits for workers. Some employees are making more income staying at home, and at the same time not risking contracting the virus. (Random Lengths, July 24, 2020)

The lack of supply in face of unexpected strong demand led to record lumber and panel prices (Figure 4).

As framing lumber and structural panel markets rebounded faster and stronger than anyone anticipated, reports spread that projects are again being delayed. This time, however, it is due to costs and availability, rather than pandemic-induced lockdowns. With prices soaring

Figure 4: Pacific Northwest Coast and Inland Lumber Prices

Source: Western Wood Products Association
to new records, project budgets are being busted. (*Random Lengths*, August 7, 2020)

The supply imbalance was initially expected to be a short-term phenomenon, but with the onset of winter and a resurgence in Covid cases, supply and price relief may be delayed. To quote from *Random Lengths* again:

> The recent surge in COVID-19 cases across the U.S. is having a significant effect on the wood products industry and its distribution channels. Mills have been hit hard. Production schedules are changing day to day, due to employees either ill from the virus or under quarantine... Staffing issues existed prior to the pandemic, with limited availability of potential employees in mill communities. The pandemic has magnified those labor problems. (*Random Lengths*, December 11, 2020)

As is typical, increases in log prices lag or never see the more market responsive product price increases, especially in the short-term (Fig. 5). On the other hand, the divergence of pricing for small landowners is not typical. It is consistent with the reduction in small landowner harvests noted earlier, but it is not clear what is causing the price discrepancy. Notice also the lower US Forest Service (USFS) prices, which are more often treatments rather than clear cuts. This means higher cost per volume harvested, and consequently, buyers pay less.

One of the biggest stories in 2019 was the trade war with China. The escalating trade war eventually led to tariffs of 5-25 percent on U.S. logs and lumber, and American exporters lost $1.5 billion dollars in sales. Hardwood lumber exports lost five years of growth, falling back to 2013 volumes. To put this in perspective, the sales lost are more than a complete loss of all U.S. log and lumber exports to Mexico, Japan, Vietnam, and Western Europe combined over the same period. There was simply no other market or combination of markets that could absorb the lost volume. The excess inventory had a toll on prices. Most hardwood lumber prices dropped around 20 percent. Hardwood timber and lumber suppliers lost both volume and value. In Washington State, Northwest Hardwoods (NWH) closed their Burlington Mill in October 2019, laying off 70 employees and blaming the trade war for the closure. Unfortunately, NWH’s problems didn’t end there, as they filed for Chapter 11 bankruptcy in November 2020. As one

---

**Figure 5: Washington State Average Timber Prices**

[Graph showing Washington State Average Timber Prices]

*Source: Washington State Department of Revenue*
of Washington’s two largest hardwood lumber producers, this was an unfortunate blow to the State’s wood products industry.

The following figures show the impact of the trade war. Figures 6 and 7 show the loss in both volume and price on softwood log exports to China. Figure 8 shows the decline in softwood lumber exports, and in Figure 9 we see the disastrous results for Washington’s hardwood lumber industry. The loss of market share will be difficult to recapture, as Chinese buyers have now become more comfortable with European and Russian species and suppliers and will be inclined to maintain their more diverse supply chains.

Washington State exported $940 million in log, lumber and engineered wood products in 2019, down from $1.3 billion in 2018 (Figure 10). Pulp and paper products fared a bit better in 2019, with exports of $1.1 billion (Figure 11 and Figure 12).
**Figure 9:** Washington State Alder Lumber Exports to China

Source: U.S. Census Bureau, USA Trade Online

**Figure 10:** Washington State Log, Lumber, and Engineered Wood Exports

Source: USA Trade Online, U.S. Census Bureau
**Figure 11: Washington State Pulp and Waste Paper Exports**

- 4702 Chemical Woodpulp, Dissolving
- 4703 Chemical Woodpulp, Sulfate
- 4707 Waste Paper

Source: USA Trade Online, U.S. Census Bureau

**Figure 12: Washington State Paper & Paperboard Exports**

- 4804 Kraft Paper & Paperboard, Uncoated
- 4811 Paper & Paperboard, Coated

Source: USA Trade Online, U.S. Census Bureau
In 2020 the COVID-19 pandemic had devastating consequences for the world economy, the U.S. economy, and Washington agriculture. In the United States, the pandemic ended the country’s longest economic expansion, leading to a large fall in real GDP and rise in unemployment. Almost all sectors of the economy were affected, including Washington agriculture. Global trade fell dramatically, further affecting this export-oriented sector. The development of COVID-19 vaccines sets the stage for robust growth in 2021, but a full recovery will likely take much longer.

World Status and Outlook

World real output dropped precipitously in 2020, primarily in the first two quarters of the year. Table 1 shows output, trade, and inflation statistics for 2019 and 2020, as well as International Monetary Fund (IMF) projections for 2021. World output fell 4.4 percent in 2020. The pandemic was a highly unexpected shock to the world economy, which at this time last year had been projected to grow 3.4 percent. The effects were felt more by advanced economies, where output fell 5.8 percent, than by emerging markets and developing economies, where output fell 3.3 percent.

A striking effect of the COVID-19 pandemic was its impact on international trade. World trade plummeted 10.4 percent, with an even greater impact across advanced economies. Global supply chains were severely disrupted. Trade will begin to recover in 2021, but the rebound likely will be muted. With projected growth of 8.3 percent in 2021, world trade volumes will remain lower than pre-pandemic levels.

United States Status and Outlook

In the United States in 2020, the COVID-19 pandemic “ended the longest economic expansion and triggered the deepest downturn in output and employment since WWII,” noted the Congressional Budget Office (CBO). The U.S. economy slowly has begun to recover from those terrible depths, but a full recovery remains far off. Table 2 reports the CBO’s year-end economic data and projections for the United States through 2021. For 2020 overall, U.S. real GDP fell 5.8 percent, while the unemployment rate shot up to 10.6 percent. As is typical, private investment was the most affected component of GDP, plunging 14.4 percent in real terms. Real private consumption, the next most affected component, declined 5.5 percent. It is worth noting that, while federal government spending on goods and services rose slightly, declines at the state and local level led to a 0.7 percent drop in the government spending component of GDP. The CBO projects that U.S. real GDP will grow 4.0 percent in 2021, but this faster-than-average growth will not be nearly enough to return the economy to its pre-pandemic peak.

U.S. monetary and fiscal policy responded to the pandemic rapidly. In terms of monetary policy, the Federal Reserve took swift action to lower short-term interest rates to near zero and to affect longer-term interest rates through quantitative easing—aggressive expansion of the monetary base. In terms of fiscal policy, Congress passed legislation...
to fund the fight against COVID-19 and to provide relief to households and small businesses. As a result, the CBO expects the 2020 federal government budget deficit to be about 15 percent of GDP, whereas budget deficits have traditionally been about 3 percent of GDP. Many are awaiting further fiscal response in the near future. The long-term cost of this is the increase in the U.S. government debt, which will eventually put upward pressure on interest rates.

**Washington Agriculture’s Relationship to the Macroeconomy**

The impact of the COVID-19 pandemic on Washington agriculture was even worse than its impact on the world and U.S. economies. Figures 2 and 3 show world and U.S. output on the left axis and Washington agricultural output on the right axis. In 2020, Washington agricultural output dropped a remarkable 11.5%. Though Washington agricultural output is projected to rebound moderately in 2021 with growth of 7.7%, this will not be sufficient for a full recovery of the sector. Higher costs associated with meeting required health and safety protocols in the wake of the pandemic may dampen the recovery. As Figure 3 shows, Washington agriculture is relatively volatile compared to the U.S. economy as a whole, so a great deal of uncertainty remains.

**Table 2: Congressional Budget Office Budget and Economic Outlook**

<table>
<thead>
<tr>
<th>Output</th>
<th>2019</th>
<th>2020*</th>
<th>2021**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real GDP (Billions of 2012 dollars)</td>
<td>$19,073.1</td>
<td>$17,968.0</td>
<td>$18,679.3</td>
</tr>
<tr>
<td>Percentage change, annual rate</td>
<td>2.3%</td>
<td>-5.8%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Components of Real GDP (Billions of 2012 dollars)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Consumption Expenditures</td>
<td>$13,280.1</td>
<td>$12,550.2</td>
<td>$12,923.9</td>
</tr>
<tr>
<td>Gross Private Domestic Investment</td>
<td>$3,421.3</td>
<td>$2,927.9</td>
<td>$3,216.8</td>
</tr>
<tr>
<td>Government Consumption Expenditures and Gross Investment</td>
<td>$3,299.0</td>
<td>$3,276.2</td>
<td>$3,308.9</td>
</tr>
<tr>
<td>Federal</td>
<td>$1,329.6</td>
<td>$1,342.8</td>
<td>$1,299.7</td>
</tr>
<tr>
<td>State and local</td>
<td>$1,948.0</td>
<td>$1,967.7</td>
<td>$2,005.4</td>
</tr>
<tr>
<td>Net Exports of Goods and Services</td>
<td>-$953.9</td>
<td>-$791.3</td>
<td>-$756.3</td>
</tr>
<tr>
<td>Exports</td>
<td>$2,332.5</td>
<td>$2,469.4</td>
<td>$2,658.7</td>
</tr>
<tr>
<td>Imports</td>
<td>$3,123.8</td>
<td>$3,225.8</td>
<td>$3,621.5</td>
</tr>
<tr>
<td>Prices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer Price Index, All Urban Consumers (CPI-U)***</td>
<td>255.7</td>
<td>258.1</td>
<td>261.2</td>
</tr>
<tr>
<td>Annual % Change in CPI</td>
<td>1.8%</td>
<td>0.9%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Labor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment Rate, Civilian, 16 Years or Older</td>
<td>3.7%</td>
<td>10.6%</td>
<td>8.4%</td>
</tr>
<tr>
<td>Labor Force, Civilian, 16 Years or Older (Millions)</td>
<td>163.5</td>
<td>160.9</td>
<td>161.7</td>
</tr>
<tr>
<td>Labor Force Participation Rate, 16 Years or Older</td>
<td>63.09%</td>
<td>61.81%</td>
<td>61.80%</td>
</tr>
<tr>
<td>Interest Rates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-Year Treasury Note</td>
<td>2.1%</td>
<td>0.9%</td>
<td>0.9%</td>
</tr>
<tr>
<td>3-Month Treasury Bill</td>
<td>2.1%</td>
<td>0.4%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Federal Funds Rate</td>
<td>2.2%</td>
<td>0.4%</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

**Income, Personal (Billions of 2009 dollars)**

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2020*</th>
<th>2021**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$17,569.6</td>
<td>$18,608.3</td>
<td>$19,208.3</td>
</tr>
</tbody>
</table>

Source: Congressional Budget Office.
* Based on forecasts of Q2–Q4
** Forecasted
*** The base year for the CPI is 1982–84 = 100
Figure 1: Real World and Washington Agricultural Output

- Real world output
- Washington agricultural output

Source: IMF World Economic Outlook and BEA

Figure 2: U.S. and Washington Agricultural Output

- U.S. output
- Washington agricultural output

Source: CBO and BEA
Washington Agriculture & International Trade

A relatively large amount of Washington agriculture is exported, so the major slowdown in international trade in 2020 had negative consequences for the sector. Table 3 shows total Washington State agricultural exports by country of destination. With regard to Washington agriculture’s leading export destination, China, exports increased slightly during 2020, though their growth slowed considerably. All other major Washington agricultural export markets were in decline, except for Vietnam and Pakistan. Trade relationships with Asia remain critical but uncertain. Part of the growth in agricultural exports from Washington will be dependent on how trade relations with China develop throughout 2021. Early fourth-quarter indicators have Washington agricultural exports spiking, but it is unclear whether those numbers can be sustained through 2021.

U.S. exporters experienced a major swing in the value of the dollar during 2020. Toward the end of the first quarter, the Federal Reserve Board’s trade-weighted dollar index rose sharply—about 10 percent relative to the start of the year. This added to the pain of U.S. exporters, as U.S. international trade partners effectively experienced a relative price increase at a time when trade barriers were mounting. The dollar then depreciated over the course of the year, ending up slightly weaker than at the start.

Summary

The COVID-19 pandemic resulted in major setbacks for the world and U.S. economies. It had an even deeper effect on Washington agriculture. With vaccination already underway, there is strong reason for optimism about the future. The pace of the economic recovery will depend in large part on the success of the fight against the pandemic. Though 2021 is expected to bring relatively robust growth, it is highly unlikely to mark the completion of the economic recovery.

<table>
<thead>
<tr>
<th>Country</th>
<th>2018</th>
<th>2019</th>
<th>2020*</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>$720,014</td>
<td>$1,387,696</td>
<td>$1,651,254</td>
</tr>
<tr>
<td>Japan</td>
<td>$892,634</td>
<td>$790,352</td>
<td>$652,517</td>
</tr>
<tr>
<td>Korea, South</td>
<td>$677,640</td>
<td>$345,767</td>
<td>$328,132</td>
</tr>
<tr>
<td>Philippines</td>
<td>$204,328</td>
<td>$272,713</td>
<td>$255,208</td>
</tr>
<tr>
<td>Canada</td>
<td>$221,719</td>
<td>$237,193</td>
<td>$211,168</td>
</tr>
<tr>
<td>Taiwan</td>
<td>$399,579</td>
<td>$286,866</td>
<td>$156,404</td>
</tr>
<tr>
<td>Vietnam</td>
<td>$242,714</td>
<td>$66,785</td>
<td>$69,424</td>
</tr>
<tr>
<td>Thailand</td>
<td>$64,337</td>
<td>$74,559</td>
<td>$63,115</td>
</tr>
<tr>
<td>Mexico</td>
<td>$67,362</td>
<td>$76,264</td>
<td>$56,646</td>
</tr>
<tr>
<td>Guatemala</td>
<td>$43,121</td>
<td>$56,837</td>
<td>$50,464</td>
</tr>
<tr>
<td>India</td>
<td>$67,242</td>
<td>$39,851</td>
<td>$18,558</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>$27,132</td>
<td>$32,435</td>
<td>$17,561</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>$23,903</td>
<td>$30,166</td>
<td>$15,566</td>
</tr>
<tr>
<td>Netherlands</td>
<td>$26,672</td>
<td>$27,617</td>
<td>$14,018</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>$15,210</td>
<td>$15,057</td>
<td>$12,132</td>
</tr>
<tr>
<td>Pakistan</td>
<td>$14,342</td>
<td>$7,095</td>
<td>$11,102</td>
</tr>
<tr>
<td>Singapore</td>
<td>$10,341</td>
<td>$12,799</td>
<td>$8,155</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>$9,419</td>
<td>$9,401</td>
<td>$7,312</td>
</tr>
<tr>
<td>Colombia</td>
<td>$7,706</td>
<td>$7,661</td>
<td>$6,894</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>$14,388</td>
<td>$7,635</td>
<td>$6,720</td>
</tr>
<tr>
<td>Brazil</td>
<td>$5,327</td>
<td>$6,275</td>
<td>$2,946</td>
</tr>
<tr>
<td>All other Countries</td>
<td>$360,665</td>
<td>$375,940</td>
<td>$295,566</td>
</tr>
</tbody>
</table>


* The fourth quarter is forecasted.
COVID-19 & the Washington Apple Industry

Karina Gallardo  (253) 445-4584

The COVID-19 pandemic has severely disrupted the food supply chain, preventing farmers from getting their products to the market at a normal pace. One stressor for apple growers in Washington state was the movement of inventories. As of August 1, 2020, Washington apple inventories reported a total of 12.5 million 40 lb boxes, 19 percent higher than the inventory left on August 1, 2019 at 10.5 million 40 lb boxes, and only 0.4 percent higher than the inventory left on August 1, 2018 at 12.4 million 40 lb boxes. Considering that the crop size of 2017-2018 was similar in volume to the crop size of 2019-2020, inventory numbers indicate that the inventory left by the end of 2019-2020 was not significantly different to the inventory left by the end of 2017-2018.

The U.S. government launched programs to help farmers cope with the pandemic, and details can be found at Coronavirus Food Assistance Program (CFAP) (USDA CFAP, 2020). The program was divided into two phases: CFAP1 that opened on May 26, accepting applications until October 9, and CFAP2 that accepted applications from September 21 to December 11, 2020.

Under CFAP1, specialty crop producers were eligible for compensations if they fell into at least one of these 3 categories: (1) crops suffered 5 percent or greater price decline between January 15 and April 15, 2020, (2) crops left the farm by April 15 but suffered spoilage due to disturbances in the marketing channel, and (3) crop shipments did not reach distribution facilities.

Figure 1: Washington State apple inventory comparison across 2018, 2019, and 2020

Source: Fresh apple holdings (1,000 cars, 1 car = 40 lb)
not leave the farm or remained unharvested, by April 15 (USDA CFAP, 2020).

Apples and pears were technically eligible for all three above mentioned categories, while sweet cherries did not appear in the list. In practice, it was not possible for Washington state apple and pear growers to qualify for categories 2 and 3 because of how the program was designed. The only payments received were for category 1. Considering the average price for all Washington apple varieties at $23.7/40 lb box in mid-January and at $21.97/40 lb box in mid-April, the decline in prices for all varieties was 8 percent. The percent difference in prices was not consistent across varieties. For example, for Red Delicious—the apple variety with the largest acreage in the state—the price decline between mid-January and mid-April was at 11 percent, whereas Gala prices experienced a price decline at 3 percent, and Honeycrisp saw an increase in price of 3 percent.

The second phase of the assistance program CFAP2 is directed to agricultural producers “who continue to face market disruptions and associated costs because of COVID-19” (USDA CFAP, 2020). Under CFAP2, payments for apples will be based on the producer’s 2019 gross sales in a declining block format using payment factors. According to the language in the CFAP2, the sales value “may include basic packaging for wholesale or bulk transportation.” However, it does not include additional packinghouse charges such as sorting, packaging, and marketing, for which growers’ gross sales are deducted. More information on this program is available at Coronavirus Food Assistance Program.


To analyze if disruptions in the supply of Washington apples were a result of COVID-19, we compare the shipment quantities and prices for years 2017-2018, 2018-2019, and 2019-2020. Figure 2 shows the comparison of apple shipment quantities. The average shipment volume in 2017-2018 was 2,466 cars (1 car=40,000 lb or 1,000 40 lb boxes), whereas shipment volumes in 2018-2019 were 2,170 cars, and in 2019-2020 were 2,280 cars. Results from an ANOVA (Analysis of Variance) show that shipment volumes for 2019-2020 were not statistically significant from volumes in 2017-2018 and 2018-2019. When comparing fluctuations in shipments, the ANOVA results show that the variance between years was statistically significant, that is, more volatility in shipments is observed 2019-2020 compared to the other two years.

Figure 3 shows the comparison of apple FOB (Free on Board) prices. The average price for all Washington grown apple varieties shipped in 2017–2018 was $24.9/40 lb box. In 2018–2019, the average price was $27.7/40 lb box and

---

**Figure 2:** Comparison of Washington State Weekly Apple Shipment Quantities across 2018, 2019, and 2020

---

![Comparison of Washington State Weekly Apple Shipment Quantities across 2018, 2019, and 2020](image-url)
in 2019–2020, it was $23.6/40 lb box. Results from an ANOVA test show that 2019–2020 prices are statistically significant different from the other two years. The average price in 2019–2020 was on average $4.1/40 lb box lower than 2018–2019, and $1.3/40 lb box lower than 2017–2018. COVID-19 affected production costs for 2019-2020 at the orchard and packinghouse level. Increased orchard costs are divided into the following categories: (1) Labor related, including bonus/performance pay, health insurance increases, COVID-19 employee training, additional cleaning and sanitation personnel, time by managers to deal with COVID-19 policies, additional employees to conduct wellness checks, take employees’ temperatures, conduct surveillance on handwashing, or provide transportation to work site; (2) sanitization materials and personal protective equipment such as masks, additional sanitation chemicals, hand sanitizer, thermometers, and investment in technologies for worker health checklists; (3) housing related, such as the costs incurred as a result of reduced capacity (e.g., a unit that used to house ten workers but can now only house five) and/or in obtaining additional housing or making changes to existing housing (sleeping areas, dining areas, etc.) to meet state or federal COVID-19 guidelines for social distancing, and costs to secure housing used for isolating any workers that test positive for COVID-19; (4) yield reduction costs, such as crops left unharvested in the field; (5) quality reduction costs such as, smaller fruit sizes, decreased grade, and any quality related price reduction due to delays in growers’ ability to conduct horticultural practices—like pruning—due to worker absences or shortages caused by COVID-19. Costs at the packinghouse level include those that are labor related, productivity related (like shutdown times), cost of sanitization materials, changes to existing facilities, and increased fruit loss in storage. Unfortunately, as of the writing date of this document, we do not have an accurate estimate in dollars per acre or dollars per box of the increased production and packing costs associated with COVID-19.

**Conclusion**

COVID-19 impacted tree fruit production by increasing the volatility of the quantities supplied especially around the weeks that marked the beginning of the pandemic. In 2019-2020, Washington state apple prices have decreased compared to previous years, especially compared to 2017-2018—a year with a comparable crop size. The decrease in prices and increases in production costs (mainly increases in labor costs) adds stressors to the Washington apple industry, the consequences of which are yet to be seen.

**References**


Introduction

The year 2020 saw no shortage of problems for agricultural and food markets. The demand and supply chain disruptions resulting from COVID-19 and the associated policy decisions that accompanied it caused an immediate and medium-term effect that persisted throughout 2020, and there is a longer-term effect that we can see stretching through 2021 and beyond as a result of revised planting practices. At the beginning of the outbreak, the shutdown of the restaurant and dining community produced a policy driven reduction in demand for potatoes at the restaurant level. The backward linked purchases from the processors then declined. Processors do not warehouse their inputs, but rather order them throughout the year from growers. Growers typically harvest their potatoes from July through early October when they go into on-farm storage. The storage costs are not free and potato quality is adversely affected by prolonged storage. Thus, the growers dumped large volumes of potatoes through “giveaways” and donations. After the potato growers had drastically reduced their inventory, restaurants began to open back up at limited capacity, but now with a drastic reduction in input supplies available to the processors. Limited production is likely to continue through 2021, and the data is bearing that out month over month.

The longer-term effect is that potatoes have a higher risk associated with their production and farmers have reduced their planted acreage by 13 percent. Of that, a large shift has been made from fresh market to processed potatoes. We suspect that this is being done to protect any forward contracts that growers may want to have in place, while still reducing the farm risk associated with their high-value, high-cost potato crop. The reduction in demand and associated long-term reduction in supply leaves the future price indeterminable. What is clear is that production and processing will be reduced for both the 2020 and 2021 years.

Three things need to be measured to assess the effect of COVID-19 on Washington State’s potato industry: 1) The lost income to growers in 2020 because the value of their 2019 harvest was, if not eliminated, drastically reduced; 2) The reduction in economic activity associated with the drop-off in processing activity; and lastly, 3) the net 2020 impact stemming from the shift in potato acreage towards corn and other lower valued crops.

2020 Status

While Washington has far fewer acres in potato production than Idaho, it is still the second largest potato producing state in the country. A large part of that has to do with the remarkable yields in Washington, roughly 40 percent higher than the national average (Table 1). However, Washington has had a static trend in yields, while Idaho and the national average have a shallow but positive gain in yields.

Washington has averaged only 50 percent of Idaho’s acreage but 75 percent of Idaho’s production value. Total Idaho production value has been trending at or above $1 billion since 2011, while Washington has been hovering around $800 million during the same period. U.S. total production value hovers near $4 billion. Between 2000 and 2019, Idaho and Washington combined to generate between 41 and 50 percent of total U.S. annual potato production.

Because Washington and Idaho produce roughly 50 percent of the nation’s potatoes, understanding how COVID-19 and the policy responses to it have altered aggregate demand is key to understanding how Washington has been affected. We begin by looking at the change in demand for processed potatoes entering broadline distribution channels. The good news is that broadline distribution captures the

Table 1: Selected 2019 Potato Production Data

<table>
<thead>
<tr>
<th>Region</th>
<th>Acres</th>
<th>Yields (cwt/acre)</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idaho</td>
<td>310,000</td>
<td>425</td>
<td>$1,108,017,500</td>
</tr>
<tr>
<td>Washington</td>
<td>165,000</td>
<td>625</td>
<td>$845,625,000</td>
</tr>
<tr>
<td>United States</td>
<td>968,300</td>
<td>449</td>
<td>$4,256,365,993</td>
</tr>
</tbody>
</table>

Source: USDA NASS Quick Stats (2020)
bulk of processed potatoes (85 percent-93 percent). The 2020 volume of processed potatoes entering broadline distribution for the three-month period (February-April) has fallen in 2019-2020. Figure 3.1 shows the trend during the three-month period in both 2019 and 2020.

The drop in demand persisted through 2020, even as restaurants slowly opened at limited capacity. The drop in volume also led to a drop in acres under production for the 2020-2021 growing season. Since potatoes available for processing in 2021 will be reduced as a result of lower acreage in production, it will be at least two years before processing exports are back to 2019 levels.

Though we do not measure the expected 2021 processing impacts, it is likely that processing will still be below normal levels. Traditionally 73 percent of potato production goes to processing, 16 percent go to the fresh market, 4 percent to chipping, and the remaining 9 percent goes to other uses. The supply of potatoes to the fresh market in the first two quarters of 2020 stayed relatively stable, but their value declined somewhat as potatoes were given away to consumers and donated to food banks, churches, and families in need.

**2020 Washington Potato Income Losses**

Potato production expenditures (e.g., fertilizers, soil testing, planting, etc.) for the potato crop harvested in October of 2019 were all made prior to the pandemic. Thus, the impacts stemming from the 2019 potato crop had already occurred, but the income to farmers from that crop had not. Farms typically put their harvest in inventory and would sell it to processors and retailers through the next year’s harvest. With the fall in processing demand for raw potatoes, the value of potatoes in cold storage dropped. Farmers, not wanting to hold high inventories and incur storage costs for a product they would not be able to sell, began dumping potatoes with shorter storage life. The drop in inventory value from market “mismatch” combined with reduced demand resulted in reduced farm income, and can be measured as the change in expected inventory value from January 2020 to March 2020. We estimate those changes in expected value by discounting the total 2019 production value of $845.6 million to account for quality loss and “dumping.” The last quarter of 2019 (Oct-Dec) and the first 2 months of 2020 (Jan-Feb) saw little change in processing demand from previous years. Prices and sales remained stable during that time. Beginning in mid-March, product entering broadline distribution fell by 50 percent and is expected to remain there through the 2020 harvest. Beginning in June, processing started to return and inventory began to be sold again. Between March and mid-May, Washington saw 200,000 tons of potatoes “returned” to growers as lost processing sales.

Total losses from the 200,000 tons sales shortfall represented $29.2 million in lost income to Washington growers. As said earlier, this represents a loss in income to Washington farmers but has not had backward linked impacts. In order to be conservative with our estimates, multiplier effects stemming from this lost income were not counted.

**2020 Production Impacts**

20,000 acres of potatoes were taken out of production and largely replaced by corn production during 2020. Corn tends to generate lower revenues per acre, but the stability in demand, storability of the good, and lower per-acre production costs tend to make it a safe haven in times of uncertainty. The reduced acreage under potato production caused a fall in expected potato value. Typically, we only shock exports, but raw potatoes do not typically get exported; rather, they get sent to processors. To account
for this, we create a mixed model as per Steinback (2004). The transfer of acreage from potatoes to corn resulted in a net reduction of economic activity of $468.7 million. The change in value added activities leads to a reduction of $270.4 million.

Table 2 outlines this information. Impact results are broken down into three categories: direct—the primary change in final demand for an industry under analysis; indirect—the business-to-business transactions that stem from the direct effects; and induced—the household-to-business transactions that stem from the owners and employees of the primary industries under analysis.

The direct effects are those related to the production and processing of potatoes. The indirect effects are driven primarily from the spending of the potato and corn growers on their vendors, including purchases from themselves. Potato growers buy seed from other potato growers, meaning intra-industry purchases are captured within the indirect effects. But this also captures the spending of the vendors on their vendors etc., until the money leaks out of the state for the purchase of imports.

The induced effects stem from the wages and salaries of the growers and their farm hands when they spend money at local restaurants, retailers, grocery stores, etc. As the income of the growers and their employees shrink, so do their expenditures and the induced effects that stem from those losses in income.

2020 Processing Contributions

The impacts from reduced processing exports do not capture the purchases from the potato growers. This avoids the double counting of the above impacts. Processors tend to have a high impact because the value-added activities drastically increase the marketing margins of a product. Processed potatoes are worth $2.4 billion in transactions annually. Given the drop in demand at the end of the first quarter and its persistence, the estimated direct reduction in exports amounts to a loss of $698.3 million. The indirect and induced effects generate an additional loss of $571.9 million and $408.1 million, respectively. Total reductions in economic activity within the state were nearly $1.7 billion. Total reductions in Value Added, or gross state product, amounted to $714.3 million, $436.4 million of which would have been salaries and wages for state citizens, including the employees at the processing facilities. This information is captured in Table 3.
Conclusions

Washington’s potato growers and processors have been adversely affected due to the prolonged restaurant closures and associated fall in demand for their product. The fall in demand has been a shock, not only directly for farmers and processors, but for all the vendors in their specialized supply chains. In all, farmers have lost roughly $29.2 million dollars from the decline in demand and quality for their 2019 harvest. They have reduced potato acreage for their 2020 growing season by 13 percent and replaced it, primarily with corn, leading to net reductions in purchases from their suppliers. Net impacts from this change in acreage and spending has resulted in $270.4 million in lost productivity to the state. Processors that have seen the demand for products like French fries, hash browns, mashed potatoes, etc. plummet, have had to watch their spending plummet in lockstep. Lost processing activity has resulted in $714.3 million in lost productivity state-wide. Total economic losses from potato production and processing in 2020, stemming from the demand shocks of COVID-19, are expected to amount to roughly $1 billion dollars in gross state product.

Table 7.1 shows the combined 2020 losses in value-added for the processing and production of potatoes in Washington State. This does not include the loss in value of the 2019 potato inventory that was “dumped,” given to food banks, or lost due to quality decline. This change in economic activity does include the loss of $54.6 million in state and local tax revenues.

References


NPD Group, Inc. 2020. Custom Data Request. 900 West Shore Road, Port Washington, NY 11050


## SECTION III. WASHINGTON DATA

<table>
<thead>
<tr>
<th>Washington ($1,000)</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gross cash income</strong></td>
<td>10,929,029</td>
<td>10,197,519</td>
<td>10,456,739</td>
<td>10,016,738</td>
<td>9,987,811</td>
</tr>
<tr>
<td><strong>All commodity receipts</strong></td>
<td>9,751,184</td>
<td>9,509,590</td>
<td>9,669,135</td>
<td>9,435,107</td>
<td>9,351,606</td>
</tr>
<tr>
<td>Crop receipts</td>
<td>6,859,833</td>
<td>7,088,673</td>
<td>7,213,199</td>
<td>6,943,527</td>
<td>6,684,349</td>
</tr>
<tr>
<td>Animals and products receipts</td>
<td>2,891,351</td>
<td>2,420,917</td>
<td>2,455,936</td>
<td>2,491,580</td>
<td>2,667,257</td>
</tr>
<tr>
<td><strong>Cash farm-related income</strong></td>
<td>970,105</td>
<td>454,713</td>
<td>574,746</td>
<td>384,706</td>
<td>411,463</td>
</tr>
<tr>
<td>Forest products sold</td>
<td>15,701</td>
<td>15,478</td>
<td>16,380</td>
<td>20,290</td>
<td>12,982</td>
</tr>
<tr>
<td>Machine hire and custom work</td>
<td>78,961</td>
<td>89,712</td>
<td>100,691</td>
<td>22,282</td>
<td>53,573</td>
</tr>
<tr>
<td>Other farm income</td>
<td>875,442</td>
<td>349,524</td>
<td>457,676</td>
<td>342,134</td>
<td>344,908</td>
</tr>
<tr>
<td><strong>Total direct government payments</strong></td>
<td>207,741</td>
<td>233,215</td>
<td>212,858</td>
<td>196,925</td>
<td>224,742</td>
</tr>
<tr>
<td><strong>Cash expenses</strong></td>
<td>7,704,156</td>
<td>7,513,284</td>
<td>7,555,928</td>
<td>7,607,289</td>
<td>6,879,267</td>
</tr>
<tr>
<td><strong>Interest</strong></td>
<td>305,378</td>
<td>323,690</td>
<td>340,289</td>
<td>378,095</td>
<td>384,641</td>
</tr>
<tr>
<td>Nonreal estate</td>
<td>119,760</td>
<td>121,780</td>
<td>133,584</td>
<td>150,025</td>
<td>146,474</td>
</tr>
<tr>
<td>Real estate</td>
<td>185,617</td>
<td>201,910</td>
<td>206,705</td>
<td>228,070</td>
<td>237,994</td>
</tr>
<tr>
<td><strong>Labor expenses</strong></td>
<td>1,824,633</td>
<td>2,050,360</td>
<td>2,065,477</td>
<td>2,075,405</td>
<td>2,201,000</td>
</tr>
<tr>
<td><strong>Property taxes and fees</strong></td>
<td>221,664</td>
<td>237,592</td>
<td>206,273</td>
<td>237,625</td>
<td>202,129</td>
</tr>
<tr>
<td>Farm origin</td>
<td>1,311,448</td>
<td>1,269,417</td>
<td>1,554,353</td>
<td>1,353,696</td>
<td>1,082,173</td>
</tr>
<tr>
<td>Feed purchased</td>
<td>750,000</td>
<td>830,000</td>
<td>1,100,000</td>
<td>870,000</td>
<td>630,000</td>
</tr>
<tr>
<td>Livestock and poultry</td>
<td>201,448</td>
<td>129,417</td>
<td>184,353</td>
<td>173,696</td>
<td>202,173</td>
</tr>
<tr>
<td>Seed</td>
<td>360,000</td>
<td>310,000</td>
<td>270,000</td>
<td>310,000</td>
<td>250,000</td>
</tr>
<tr>
<td><strong>Manufactured inputs</strong></td>
<td>1,383,611</td>
<td>1,318,120</td>
<td>1,319,886</td>
<td>1,190,002</td>
<td>1,042,113</td>
</tr>
<tr>
<td>Electricity</td>
<td>139,125</td>
<td>121,571</td>
<td>147,557</td>
<td>97,866</td>
<td>93,599</td>
</tr>
<tr>
<td>Fertilizer and lime</td>
<td>560,000</td>
<td>500,000</td>
<td>410,000</td>
<td>380,000</td>
<td>350,000</td>
</tr>
<tr>
<td>Fuel and oil</td>
<td>234,486</td>
<td>256,549</td>
<td>202,329</td>
<td>232,136</td>
<td>198,514</td>
</tr>
<tr>
<td>Pesticides</td>
<td>450,000</td>
<td>440,000</td>
<td>560,000</td>
<td>480,000</td>
<td>400,000</td>
</tr>
<tr>
<td><strong>Other intermediate expenses</strong></td>
<td>2,107,449</td>
<td>1,882,938</td>
<td>1,691,738</td>
<td>2,110,090</td>
<td>1,739,714</td>
</tr>
<tr>
<td><strong>Net rent to landlords</strong></td>
<td>549,972</td>
<td>431,169</td>
<td>377,910</td>
<td>262,375</td>
<td>227,498</td>
</tr>
</tbody>
</table>

Data Reported in nominal dollars
Source: USDA ERS Farm Income and Wealth Statistics