United States Department of Agriculture

Economic Research Service | Situation and Outlook Report

VGS-367 | November 19, 2021

Next release is April 29, 2022

Vegetables and Pulses Outlook: November 2021

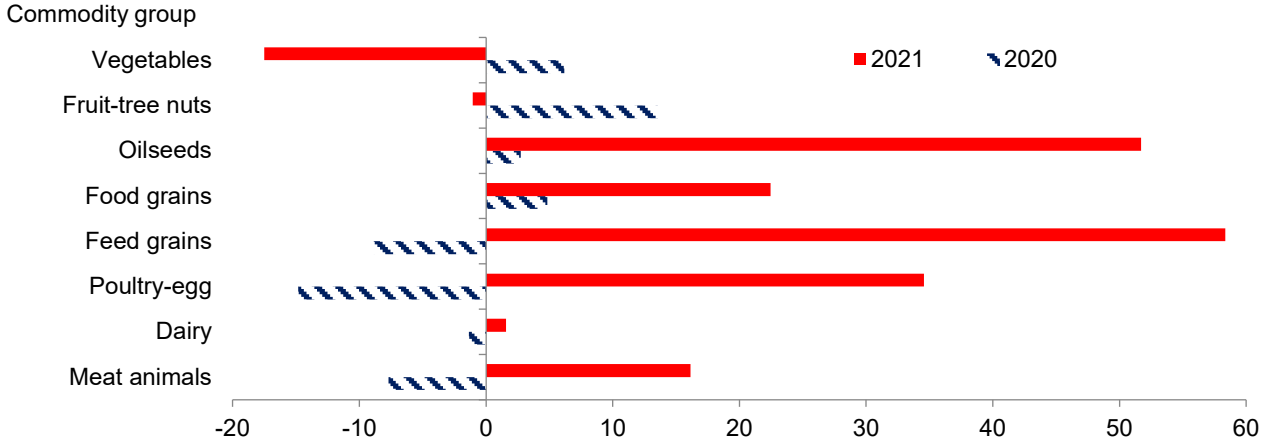
Wilma V. Davis and Gary Lucier

In this report:

Fresh Farm Prices Lower in 2021

According to data from USDA's National Agricultural Statistics Service, shipping-point prices for fresh vegetables averaged 18 percent below the previous year's average during the first 9 months of 2021. Despite hot, dry growing conditions, water shortages in western States, fluctuating truck availability, and high input prices, specialty crops partially offset the substantial national price gains in other farm commodities in 2021. Farm prices for feed grains, oilseeds, and poultry and eggs each jumped by more than a third from pandemic-influenced 2020 levels. However, prices for vegetables are expected to shift during the last quarter of 2021 to register moderate gains over the previous year largely due to drought and heat-related impacts on yields. Higher prices are expected to linger through at least early December for fresh vegetables but will extend well into 2022 for potatoes, processed tomato products, and pulse crops.

Farm prices: Change from year earlier, January–September index average[1]



[1] Percent change from previous year in January–September average prices received indexes.

Source: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service data.

Industry Overview

Drought Impacts Widespread in 2021

In addition to the ongoing coronavirus (COVID-19) pandemic, extreme heat and dry weather reduced production of several key crops this year. The extreme heat negatively impacted crop yields for potatoes, tomatoes, and pulse crops, whereas shortages of irrigation water (particularly in California) caused growers to reduce acreage for crops such as processing tomatoes. The supply chain issues affecting parts of agriculture and the rest of the economy have not been as severe for fresh vegetables. Fresh vegetable supply has been hindered at times this year by truck and/or driver shortages, field and packing-house labor availability, and problems obtaining pallets and packing materials. Since vegetable imports and exports are heavily centered within North American markets, port backups have been less of an issue with most delays originating with trucking issues or railyard loading delays.

USDA's National Agricultural Statistics Service (NASS) domestic vegetable prices received index declined by 18 percent from (January – September) of 2020. The largest free on board (f.o.b.) price declines in non-organic vegetables were for crown-cut broccoli and green bell peppers with declines of 29 and 25 percent, respectively. The largest 2021 organic f.o.b. price declines were for crown-cut broccoli (34 percent), green leek onions (33 percent), and red cabbage (32 percent) in comparison with the previous year.

Fresh market vegetable shipments (domestic and imports) rose 7 percent from a year earlier during January–September 2021. Most of the increase in market shipment volume was due to greater imports and kept total shipment volumes increasing over 2020. Fresh vegetable import volumes increased by 10 percent from January–September 2021 in comparison to January–September 2020. Lettuce imports increased 23 percent from 560 to 686 million pounds, which contributed to the overall increase in imports from 2020 to 2021.

Supplies of processed tomato products are lower than a year earlier because 2021 area planted, yields, and production were less than anticipated and carryover stocks are low. With domestic demand and exports remaining relatively strong, wholesale prices for tomato products have risen. According to the latest publicly available data from August 2021, the price for 31 percent natural tomato soluble solids (NTSS) industrial tomato paste—the base ingredient required to manufacture most sauces, soups, and ketchup)—was 28 percent higher than the

previous year. This was the highest nominal paste price since January 2009 and the highest for August since 1989.

Mushroom farm value during the 2020/21 marketing year (MY) decreased 8 percent from the 2019/20 MY. Total mushroom sales fell by 7 percent to 758 million pounds, reflecting interruptions and slowdowns in both the production cycle and foodservice demand during the height of the COVID-19 pandemic. A 3-percent drop in the total area of Agaricus mushrooms was additionally reinforced by a 5-percent decline in yield per square foot. The average reported price for all mushroom sales in MY 2020/21 was $1.40 per pound, down about 1 percent from the 2019/20 MY.

Supply and demand factors are in place to promote higher U.S. potato prices in the 2021/22 MY. Factors include a smaller U.S. crop, strong North American processing demand, and post-pandemic surging international demand boosting both U.S. export demand and prices for imported potato products. As a result, the 2021/22 MY U.S. season-average potato price is expected to reach a nominal dollar record high—exceeding $10.00 per hundredweight (cwt) for the first time—as potato supplies tighten and processors siphon volume from the fresh market. In September 2021, the all-potato price (fresh and processing) was reported to be $14.00/cwt, up 17 percent from September 2020.

Dry bean production in the September 2020 – August 2021 marketing year is down by 31 percent from the 2019/20 MY as nearly every dry bean producing State reported production declines with the most significant production declines within the top 3 dry bean producing States, North Dakota, Michigan, and Minnesota reflecting both lower acreage and generally lower yields. Dry pea, lentil, and chickpea yields were down for the 2020/21 marketing year due to drought. Dry pea yield is down 41 percent, lentil yield is down 47 percent, large chickpea yield is down 48 percent, and small chickpea yield is down 57 percent from 2020.

September 2021 pulse (dry bean, dry pea, lentil, and chickpea) prices are all significantly up from September 2020 prices. The September 2021 dry bean price is up 26 percent at $37.80/cwt, the chickpea all class price at $29.20/cwt is up by 57 percent, the lentil price at $31.80/cwt is up by 73 percent, and the dry pea price at $15.00/cwt is 66 percent above the from September 2020 price. Prices for all pulses for the 2021/22 MY are expected to continue increasing as harvested acreage and drought-reduced yields have reduced supplies. Higher prices are likely to encourage pulse producers to increase planted acreage for the 2022/23 marketing year.

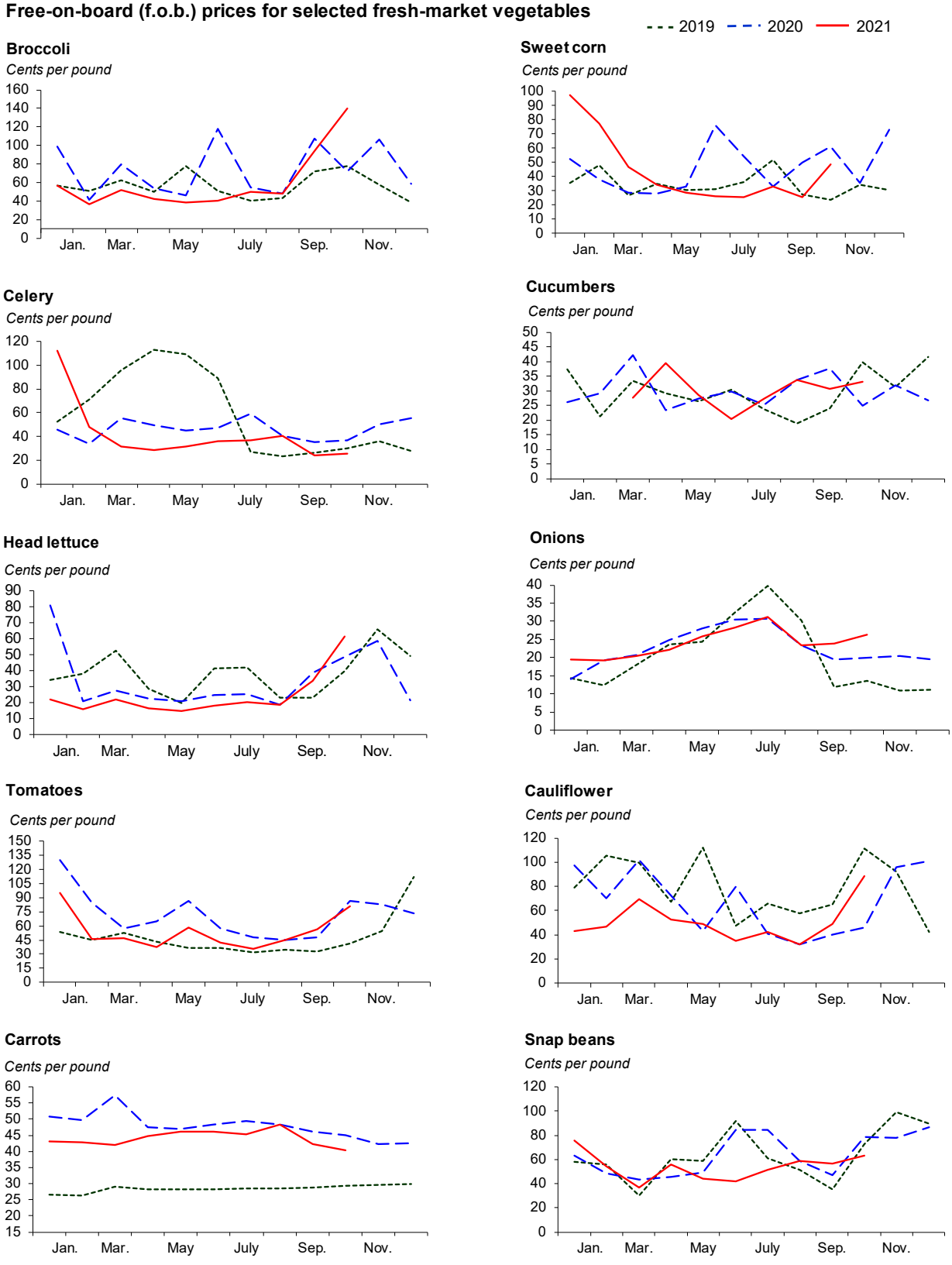
Table 1. U.S. vegetable and pulse industry at a glance, 2018–21[1]

Item	Unit	2018	2019	2020	2021f	Percent change 2020–21
Area harvested						
Vegetables, fresh and processed	*1,000 acres*	2,485	2,357	2,326	2,386	2.6
Potatoes	*1,000 acres*	1,015	937	912	942	3.4
Dry beans, peas, and lentils	*1,000 acres*	3,554	3,099	3,426	3,295	-3.8
Mushrooms[2]	*1,000 acres*	30	27	31	30	-3.1
Total	***1,000 acres***	**7,084**	**6,420**	**6,695**	**6,653**	**-0.6**
Production, utilized						
Vegetables, fresh	*Million cwt*	365	362	354	365	3.1
Vegetables, processing[4]	*Million cwt*	363	325	330	315	-4.6
Potatoes	*Million cwt*	450	424	420	413	-1.6
Dry beans, peas, and lentils	*Million cwt*	63	55	66	43	-35.4
Mushrooms[2]	*Million cwt*	9	8	8	8	-7.2
Total	***Million cwt***	**1,249**	**1,175**	**1,178**	**1,143**	**-3.0**
Crop value						
Vegetables, fresh	*$ millions*	10,695	11,618	11,058	10,403	-5.9
Vegetables, processing[4]	*$ millions*	2,175	1,938	2,008	1,887	-6.0
Potatoes	*$ millions*	4,006	4,217	3,911	4,380	12.0
Dry beans, peas, and lentils	*$ millions*	1,263	1,087	1,415	1,257	-11.2
Mushrooms[2]	*$ millions*	1,135	1,115	1,153	1,064	-7.8
Total	***$ millions***	**19,274**	**19,975**	**19,545**	**18,989**	**-2.8**
Unit value[3]						
Vegetables, fresh	*$/cwt*	29.34	32.06	31.25	28.50	-8.8
Vegetables, processing	*$/cwt*	6.00	5.96	6.09	6.00	-1.5
Potatoes	*$/cwt*	8.90	9.94	9.30	10.60	14.0
Dry beans, peas, and lentils	*$/cwt*	20.17	19.93	21.31	29.30	37.5
Mushrooms[2]	*$/cwt*	130.57	134.02	141.27	140.35	-0.7
Total	***$/cwt***	**15.44**	**17.01**	**16.59**	**16.61**	**0.1**
Imports						
Vegetables, fresh	*$ millions*	7,950	8,514	9,527	10,003	5.0
Vegetables, processing[4]	*$ millions*	3,216	3,164	3,559	4,021	13.0
Potatoes	*$ millions*	1,511	1,529	1,734	2,047	18.0
Dry beans, peas, and lentils	*$ millions*	275	237	315	322	2.0
Mushrooms[2]	*$ millions*	403	435	479	556	16.0
Total	***$ millions***	**13,355**	**13,880**	**15,614**	**16,948**	**8.5**
Exports						
Vegetables, fresh	*$ millions*	2,312	2,392	2,306	2,350	1.9
Vegetables, processing[4]	*$ millions*	2,236	2,196	2,038	2,324	14.0
Potatoes	*$ millions*	1,787	1,925	1,675	1,993	19.0
Dry beans, peas, and lentils	*$ millions*	535	620	783	830	16.1
Mushrooms[2]	*$ millions*	47	44	42	46	8.0
Total	***$ millions***	**6,917**	**7,177**	**6,844**	**7,542**	**10.2**
Per-capita availability						
Vegetables, fresh	*Pounds*	149.6	142.0	147.0	150.0	2.0
Vegetables, processing[4]	*Pounds*	117.5	110.7	116.9	101.6	-13.1
Potatoes	*Pounds*	117.6	112.6	115.0	113.2	-1.6
Dry beans, peas, and lentils	*Pounds*	13.2	10.4	9.6	8.5	-11.6
Mushrooms[2]	*Pounds*	3.9	3.8	3.7	3.5	-6.6
Total	***Pounds***	**401.9**	**379.4**	**392.3**	**376.8**	**-4.0**

Note: f = USDA, Economic Research Service forecast. Hundredweight (cwt) = 100 pounds. All international trade data are expressed on a calendar-year basis.
1/ Total values rounded. 2/ Mushroom area equals total fillings (multiple crops). 3/ Ratio of total value to total production.
4/ Includes canned, frozen, and dried. Excludes potatoes, pulses, and mushrooms.
Sources: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service data and U.S. Department of Commerce, Bureau of the Census trade data

Figure 1

Free-on-board (f.o.b.) prices for selected fresh-market vegetables



Source: USDA, National Agricultural Statistics Service and USDA, Agricultural Marketing Service, *Market News*.

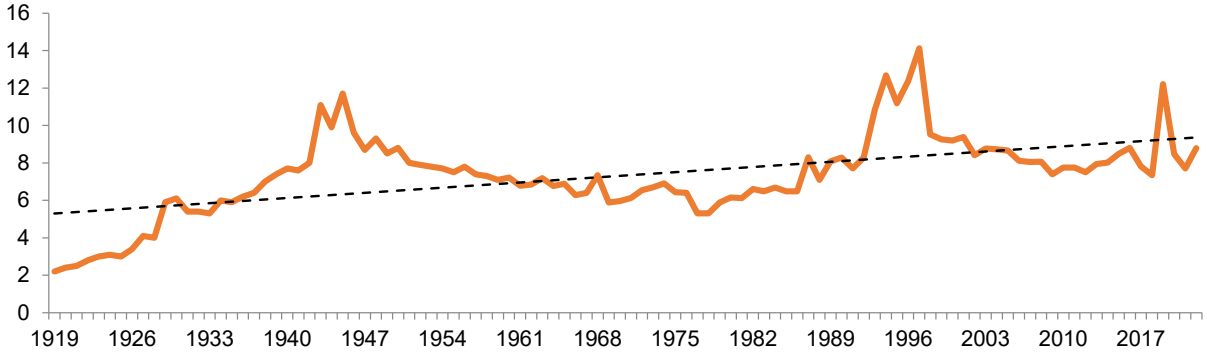
Commodity Highlights

Fresh-Market Carrots

Cultivated carrots first arrived in North America with the early Virginia colonists, spawning fresh-market production with a farm value of more than $670 million annually in the United States during 2018–20. A member of the Umbelliferae/Apiaceae (parsley) family—along with celery, parsley, parsnips, and dill—carrots are thought to be native to central or western Asia (likely Afghanistan). In addition to its use as a cooking vegetable, salad item, snack food, and raw vegetable, carrots can also be thought of as a functional food. This is largely due to their beta carotene—a precursor to the antioxidant, Vitamin A—content, which makes carrots an important source of Vitamin A for consumers in the United States. Carrots also provide vitamin C, thiamine, riboflavin, potassium, minerals, and dietary fiber.

Over the past 35 years, the U.S. carrot industry has markedly changed, having been transformed by the introduction of fresh-cut technology. In 1986, a prominent California carrot grower invented the fresh-cut baby carrot to gain more value from some of the broken and misshapen carrots culled from the fresh carrot packing line. Although more expensive than the traditional cellophane-wrapped carrot pack, baby and other fresh-cut carrot products eventually earned widespread appeal by the early 1990s. Consumers recognized the convenience of these new products, which broadened the carrot market by making them more portable, convenient, and tasty.

Figure 2
U.S. fresh carrot per capita domestic availability, 1919–2022
Pounds per person



Source: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service and U.S. Department of Commerce, Bureau of the Census data.

Fresh carrot per capita availability has trended upward over the past century (figure 2). Driven by fresh-market use, long-run consumer interest in carrots has been strong in the United States, used in soups, stews, snacks, and desserts.

Per capita availability of fresh carrots peaked in 1997 at 14.1 pounds during the initial introductory period of fresh-cut products. Despite the widespread appeal and convenience of fresh-cut products, availability of all fresh carrots then trended downward from the 1997 peak. This drop may have simply reflected reduced demand for whole (heavier-weight) carrots as lighter pre-packaged fresh-cut products shifted demand. However, it is also plausible that the maturation of the fresh-cut industry fostered increased production and processing efficiency within the industry, reducing packing house waste and requiring fewer acres and raw carrot production.

The trend in fresh carrot availability began to reverse and slowly increase after 2009 as the general economy began to recover from the 2008 Great Recession. During the 5-year period of 2015–19, per capita availability of fresh carrots had returned to the average experienced in 2000–04 (table 2).

Table 2. Fresh carrots: U.S. supply and availability

Period	Area harvested[1]	Yield per acre[1]	Production	Imports	Total supply	Availability			Deflated Price[2]
						Exports	Domestic	Per capita	
	1,000 ac	*Cwt per ac*	*Million pounds*					*Pounds*	*Dollars per cwt*
1970–74	77.6	262	1,363	56	1,419	66	1,353	6.4	28.42
1974–79	75.2	265	1,317	74	1,390	97	1,293	5.9	29.17
1980–84	86.8	262	1,502	118	1,620	132	1,488	6.4	25.93
1985–89	95.1	272	1,811	121	1,931	159	1,772	7.3	21.86
1990–94	103.4	313	2,503	135	2,638	174	2,464	9.6	18.44
1995–99	101.8	345	3,101	206	3,307	230	3,077	11.3	19.42
2000–04	86.9	309	2,681	192	2,873	310	2,563	8.9	21.75
2005–09	76.4	319	2,440	253	2,693	263	2,430	8.1	24.66
2010–14	70.8	335	2,367	368	2,735	239	2,496	7.9	28.33
2015–19	69.4	405	2,596	472	3,067	164	2,903	8.9	25.92
2020–24f	65.1	417	2,603	536	3,139	153	2,985	8.9	23.34

Note: f = USDA, Economic Research Service forecast. Ac = acre, Cwt = hundredweight (100 pounds).
1/ Area and yield from 1970–92 and 2016–present include carrots destined for processing. 2/ Price is in constant 2012 dollars.
Source: Compiled and computed by USDA, Economic Research Service using USDA, National Agricultural Statistics Service and U.S. Department of Commerce, Bureau of the Census data.

According to the United Nations' Food and Agriculture Organization (FAO), the United States is the third-leading producer of carrots—both fresh and processing—with 4 percent of global output following China (48 percent) and Uzbekistan (6 percent). According to USDA, NASS's 2017 Census of Agriculture, fresh-market carrots accounted for 77 percent of all carrots grown

on U.S. farms—up from 71 percent in 2012. Fresh-market carrots are grown in each of the 50 States. Based on reported area and yields, commercial output occurs primarily in California (79 percent), Arizona (4 percent), Texas (2 percent), and Washington (1 percent). According to annual estimates by USDA, NASS, over the 2015–19 period, U.S. commercial growers produced an annual average of 2.6 billion pounds of fresh carrots—10 percent more than during 2010-–14, but 16 percent less than the 1995–99 peak (table 2). As with many vegetable crops, U.S. carrot commercial production is highly concentrated among few farms. In 2017, 91 percent of national area was harvested by less than 2 percent of the 8,106 farms that had reported growing fresh-market carrots. About 89 percent of farms reporting harvested less than an acre in 2017, likely selling at farmers markets, roadside stands, and other local venues. an acre of carrots is about 22 tons.

Carrots have taken hold in the expanding organic vegetable market. Total U.S. organic vegetable sales were valued at $2.1 billion in 2019 of which carrots accounted for $132 million. About 12 percent of domestic carrot acreage (fresh and processing) was found to be produced organically. According to the 2019 Organic Vegetable Survey, certified organic carrot area (fresh and processing) totaled 11,959 acres—third only to potatoes and spinach among individual commodities grown organically and 5 percent of all certified organic vegetable area. As in conventionally produced carrots, California farms account for the vast majority (79 percent) of organic carrot production.

As with most fresh-market vegetables, the import share of availability of fresh carrots has trended higher with greater import volume over time. Imports accounted for 16 percent of domestic availability during 2015–19, more than double that of 2000–05. The leading suppliers of fresh carrots to the U.S. market are Mexico (46 percent), Canada (43 percent), and Israel (8 percent).The COVID-19 pandemic slowed fresh carrot imports in 2020 but a combination of recovering demand and the California drought has 2021 volume running 11 percent above a year earlier through September.

U.S. exports of fresh carrots have declined since peaking during 2000–04. During 2015–19, 5 percent of fresh carrot supplies were exported—less than half than in the 2000–04 period. The top U.S. markets for fresh carrot exports are Canada (90 percent) and Mexico (8 percent). Export volume was running 1 percent below a year earlier through September.

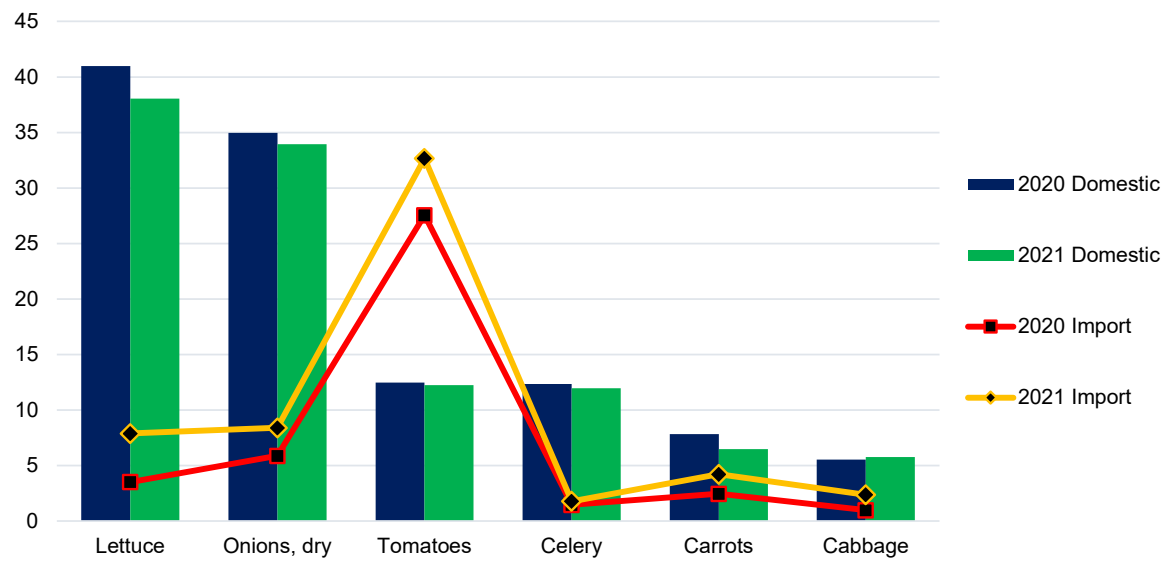
Fresh Market Vegetables

Domestic Vegetable Shipments Down as Drought Continues

The drought affecting the western U.S. has continued and the National Oceanic and Atmospheric Administration (NOAA) reports the drought now affects over 90 percent of the West with the brunt of the effects being most pervasive in California. Virtually all of California's vegetable crops are produced under irrigation. Reduced irrigation water availability affects the vegetables growers choose to produce and the number of acres, yield per acre, and available supply. Likely reflecting reduced area and adverse weather impacts such as excessive heat, shipments from domestic producers declined for most fresh vegetables while import shipments increased in January–September 2021 (figure 3).

Figure 3
Selected domestic and import fresh market vegetable shipments, January–September, 2020–21

Volume (10 million pounds)



Note: January–September represents year-to-date (YTD) shipping movement.
Source: USDA, Agricultural Marketing Service, Fruit and Vegetable Market News, *Movement Reports*.

Most of the market shipment volume increase was due to greater imports and kept total shipments—both domestic and imports—volume increasing in comparison to January – September 2020. All of the major fresh vegetable import shipments from January 2021 – September 2021 are up from the same months in 2020. Overall tomato import shipment volume increased by 18 percent, celery increased by 21 percent, onions increased by 43 percent, carrots increased by 71 percent, lettuce increased by 124 percent, and cabbage increased by

141 percent from the previous year. In contrast, nearly all domestic shipments from the previous year declined except for the 4 percent increase in cabbage. Among the six major fresh vegetables, the largest decline in domestic shipments were with carrots shipments (down 17 percent) and lettuce (down 7 percent) in comparison to January–September 2020.

Table 3 provides a more detailed breakdown of specific types of fresh vegetable shipments from January 2021–September 2021 in comparison to the same months in 2020. Potatoes and sweet potatoes were excluded in addition to several other commodities. The criteria selection was limited to commodities with domestic shipment volumes over 500,000 hundreweight through September 2021. Based on the selection criteria, the commodities with the largest domestic shipment volume in 2021 were onions of multiple varieties with 33 million hundreweight, iceberg lettuce with 18 million hundreweight, romaine lettuce with 16 million hundredweight, and celery with 11 million hundreweight.

Table 3. Selected U.S. fresh market vegetable shipment volumes, January – September, 2020–21[1]

	2020		2021		Change[2]	
Selected Commodities	**Domestic**	**Total**	**Domestic**	**Total**	**Domestic**	**Total**
	Thousand hundredweight				*Percent*	
Artichokes (multiple varieties)	606	649	602	649	-0.6	0.0
Beans, snap (multiple varieties)[3]	1,214	2,503	1,079	2,759	-11.2	10.2
Broccoli (multiple varieties)[3]	5,178	9,459	5,060	9,974	-2.3	5.4
Brussels sprouts, unspecified	727	1,960	791	2,317	8.8	18.2
Cabbage (multiple varieties)[3]	5,532	6,510	5,761	8,123	4.1	24.8
Cabbage, Chinese	555	912	398	479	-28.2	-47.5
Carrots, unspecified[3]	7,822	10,280	6,480	10,698	-17.2	4.1
Cauliflower, unspecified	4,329	4,608	4,149	5,134	-4.2	11.4
Celery (hearts/unspecified)[3]	12,348	13,811	11,961	13,742	-3.1	-0.5
Cucumbers (multiple varieties)[3]	1,979	16,358	2,090	20,166	5.6	23.3
Greens, collard	413	417	308	309	-25.4	-25.9
Greens, kale[3]	613	741	554	599	-9.7	-19.2
Greens, unspecified	597	597	594	594	-0.4	-0.4
Lettuce, Boston	132	135	125	125	-5.1	-7.3
Lettuce, green leaf	1,555	1,555	1,337	1,337	-14.0	-14.0
Lettuce, iceberg[3]	18,951	20,484	18,245	20,017	-3.7	-2.3
Lettuce, red leaf	431	431	362	362	-16.0	-16.0
Lettuce, romaine[3]	15,851	16,407	16,097	16,104	1.6	-1.8
Onions, dry (multiple varieties)[3]	34,956	40,830	33,954	42,351	-2.9	3.7
Peppers, bell[3]	4,332	14,514	4,086	16,412	-5.7	13.1
Peppers, chile (multiple varieties)[3]	157	8,188	142	10,653	-9.6	30.1
Spinach, unspecified[3]	899	1,194	891	1,320	-0.9	10.5
Squash (multiple varieties)[3]	1,121	8,082	1,134	8,899	1.1	10.1
Sweet corn (multiple varieties)	6,934	8,214	6,576	8,221	-5.2	0.1
Tomatoes (multiple varieties)[3]	8,705	22,329	8,679	25,022	-0.3	12.1
Tomatoes (cherry/grape)[3]	1,028	2,890	924	3,180	-10.2	10.0
Tomatoes (plum/roma)3	2,749	14,817	2,635	16,702	-4.2	12.7
Selected total	139,712	228,873	135,011	246,245	-3.4	7.6

Note: January – September represents year-to-date (YTD) totals. Data for 2021 are preliminary. Imports are as reported by Market News and are not all inclusive.
1/ Thousand hundredweight = 100,000 pounds. 2/ Change from YTD September 2020–21. 3/ Includes protected culture.
Source: USDA, Agricultural Marketing Service, *Fruit and Vegetable Market News* , Movement Reports.

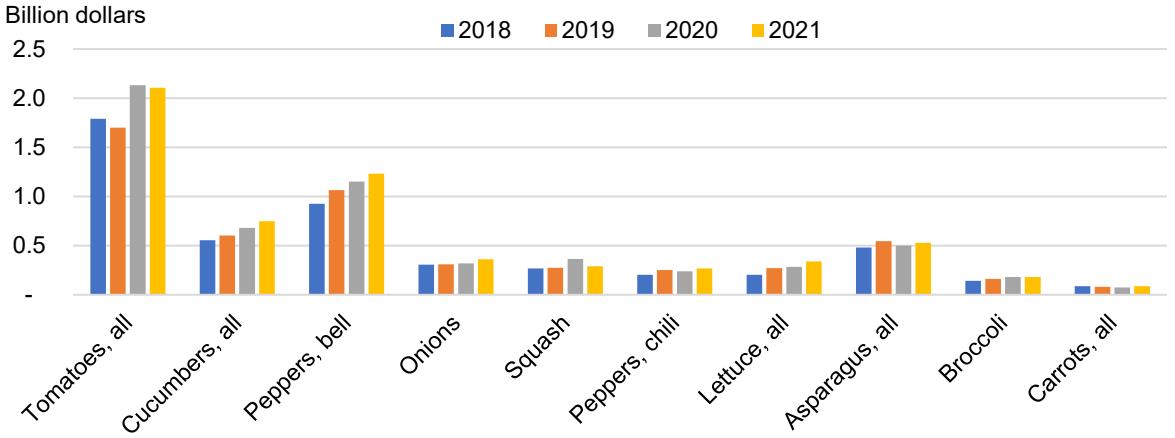
In comparison to the previous year, only romaine lettuce increased (up 1 percent) its domestic shipment volume. Overall the largest declines in domestic shipment volumes were Chinese

cabbage (down 28 percent), collard greens (down 25 percent), carrots (down 17 percent), and red leaf lettuce (down 16 percent).

Fresh Vegetable Imports and Exports Rise

The U.S. remains a net importer of fresh market vegetables. Clear upward trends in import values for cucumbers, peppers, lettuce, and broccoli are shown in figure 4 from 2018–2021 but these upward trends are much longer-term trends.

Figure 4
Fresh vegetable import values, 2018–21



Source: USDA, Economic Research Service calculations using U.S. Department of Commerce, Bureau of the Census data.

There is also a steady upward trend in fresh vegetable import volumes (up 10 percent) when compared with January–September 2020 (table 4). Although sweet potatoes represent the smallest share of total imports for the selected commodities in table 4, sweet potato imports in 2021 had the greatest increase (up 361 percent) from 2020 from 16 to 73 million pounds. After the increase in sweet potato imports, the increase in lettuce imports (up 23 percent) from 560 to 686 million pounds contributed to the overall increase in imports over the previous year. The only fresh vegetable in 2021 experiencing an import volume decrease was potatoes from 661 to 630 million pounds.

Fresh vegetable export volume from January–September 2021 also increased (up 7 percent) from January–September 2020. The largest fresh vegetable export was potatoes (up 19 percent) from 819 to 976 million pounds and sweet corn (up 10 percent) from 122 to 134 million pounds. The only declines in fresh vegetable exports in 2021 were celery (down 8 percent) from 171 to 158 million pounds and carrots (down 1 percent) from 175 to 172 million pounds.

Table 4. Selected fresh market vegetable trade volume, 2018–21[1]

Commodities	2020 Annual	January – September 2018	2019	2020	2021	Change 2020–21
		---------- Million pounds ----------				-- Percent --
Imports, fresh:						
Tomatoes, all	4,053	3,169	3,103	3,063	3,295	7.6
Cucumbers	2,193	1,535	1,620	1,610	1,734	7.7
Peppers, bell	1,667	1,195	1,235	1,282	1,425	11.2
Onions, bulb	1,237	950	838	917	1,088	18.7
Squash[2]	1,209	760	824	818	852	4.1
Peppers, chile	970	698	699	692	825	19.3
Lettuce, all	821	453	584	560	686	22.5
Asparagus	586	441	439	453	509	12.3
Broccoli	542	298	356	373	393	5.4
Carrots	467	357	361	344	380	10.7
Other	3,304	2,100	2,364	2,426	2,623	8.1
Subtotal	**17,048**	**11,955**	**12,422**	**12,536**	**13,809**	**10.2**
Mushrooms	179	108	122	131	141	7.5
Potatoes	926	688	514	661	630	-4.7
Sweet potatoes	20	21	20	16	73	360.7
Total	**18,173**	**12,772**	**13,078**	**13,344**	**14,653**	**9.8**
Exports, fresh:						
Onions, dry bulb	742	439	572	468	488	4.3
Lettuce, all	705	536	542	536	552	3.2
Cauliflower	238	215	181	188	203	8.3
Celery	233	183	146	171	158	-8.0
Carrots	208	178	170	175	172	-1.3
Tomatoes, all	145	134	128	108	115	6.3
Sweet corn	134	136	115	122	134	10.1
Other	1,044	838	823	772	827	7.2
Subtotal	**3,450**	**2,660**	**2,678**	**2,539**	**2,650**	4.4
Potatoes	1,043	787	927	819	976	19.2
Sweet potatoes	576	512	418	461	469	1.7
Mushrooms, all	18	13	13	12	12	3.7
Total	**5,088**	**3,971**	**4,036**	**3,831**	**4,108**	**7.2**

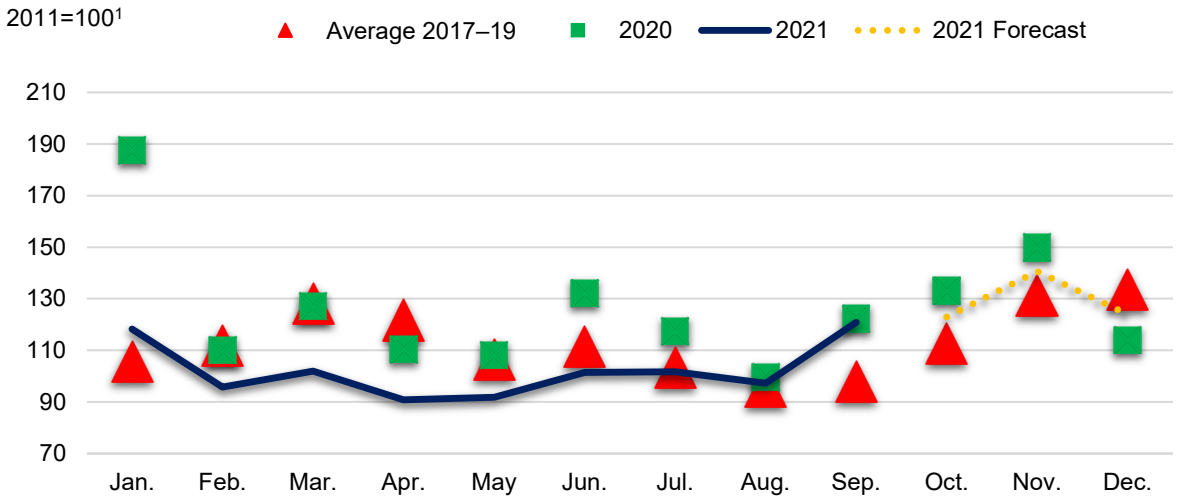
[1]Excludes seeds, melons, and dry pulses. [2]Includes chayote.
Source: USDA, Economic Research Service calculations using U.S. Department of Commerce, Bureau of the Census data.

Fresh Vegetable Prices Fall but Rising in Fourth Quarter

The domestic vegetable price index computed by USDA's National Agricultural Statistics Service is utilized to determine the industry average price change. The vegetable price index during January–September of 2021 declined by 18 percent from the same months in 2020 (table 5). Overall, the outlook for 2021 fourth quarter vegetable prices are expected to rise but

overall remain below 2020 prices (figure 5).

Figure 5
Monthly vegetable price index, average 2017–21



1/ Price index with base period of 2011 (the period when the index equaled 100).
Source: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service data.

Non-organic and Organic F.O.B. Price Comparisons

Domestic f.o.b. average prices from USDA, Agricultural Marketing Service (AMS) parallel with the overall NASS price index decline for several of the selected vegetables reported in table 5, which shows price declines comparing January–September 2021 to the same months in 2020. The criteria used to select the specific types of vegetables in table 5 are those that have both organic and non-organic pricing through September of 2020 and 2021, whichcould be analyzed on a per pound basis. The largest f.o.b. price declines in 2021 non-organic vegetables were with crown-cut broccoli and green bell peppers with declines of 30 and 26 percent, respectively. The largest 2021 organic f.o.b. price declines were for crown-cut broccoli (34 percent), green leek onions (33 percent), and red cabbage (32 percent) when compared with the previous year.

Organic price premiums are typical and the largest organic premiums for the selected vegetables in 2021 were for red leaf lettuce (103 percent above non-organic), romaine lettuce (106 percent above non-organic), green leaf lettuce (120 percent above non-organic), round green cabbage (131 percent above non-organic), and green bell peppers (144 percent above non-organic) compared with the same non-organic types. There were also a couple vegetable types, celery hearts and green leek onions, with no organic price premium through quarter 3 of 2021, though organic price premiums for those same vegetable types were achieved through the same quarters in 2020.

Table 5. U.S. fresh market vegetable Free on Board (f.o.b.) average prices, January – September, 2020–21[1]

	Jan. 2020 – Sep. 2020		Jan. 2021 – Sep. 2021		Change 2020–21[2]	
Selected commodities	Non-organic	Organic	Non-organic	Organic	Non-organic	Organic
	Dollars per pound				*Percent*	
Artichokes, globe	0.69	1.12	0.73	1.03	6.6	-8.2
Asparagus, green	1.96	2.94	1.92	2.55	-2.0	-13.4
Broccoli, crown cut	0.76	1.48	0.53	0.97	-29.9	-34.1
Cabbage, red	0.23	0.68	0.31	0.46	35.7	-32.1
Cabbage, round green	0.19	0.57	0.19	0.45	-0.2	-20.9
Carrots, baby peeled	0.62	0.96	0.62	0.99	0.1	3.1
Carrots, unspecified	0.32	0.49	0.34	0.50	5.4	2.0
Cauliflower, white	0.60	0.99	0.50	0.72	-17.6	-27.1
Celery, hearts	0.58	0.71	0.60	0.57	2.9	-19.8
Celery, unspecified	0.19	0.34	0.18	0.28	-5.4	-19.1
Greens, kale, lacinato (Tuscan)	0.42	0.75	0.52	0.67	24.1	-9.8
Greens, kale	0.36	0.72	0.40	0.64	8.6	-10.9
Lettuce, green leaf	0.54	0.97	0.41	0.91	-24.0	-6.7
Lettuce, iceberg	0.27	0.31	0.21	0.34	-22.7	8.8
Lettuce, red leaf	0.51	0.97	0.45	0.91	-12.2	-5.6
Lettuce, romaine, hearts	0.43	0.54	0.34	0.47	-21.8	-13.2
Lettuce, romaine	0.31	0.57	0.25	0.51	-19.9	-10.0
Onions, dry, yellow	0.56	0.72	0.47	0.65	-17.0	-8.8
Onions, green, leeks	0.97	1.62	1.09	1.09	11.9	-32.5
Parsley, curly	0.51	0.90	0.50	0.80	-2.2	-10.7
Parsley, plain	0.53	0.92	0.50	0.81	-6.5	-11.8
Peppers, bell, green	0.66	1.46	0.49	1.19	-25.8	-18.5
Spinach, flat	0.79	1.19	0.66	0.83	-15.5	-29.9
Sweet potatoes, Japanese	0.83	0.97	0.91	0.95	10.0	-1.5
Sweet potatoes, orange	0.43	0.78	0.37	0.69	-12.9	-12.1
Sweet potatoes, red	0.60	0.79	0.47	0.69	-21.8	-13.1
Sweet potatoes, white	0.63	0.80	0.53	0.72	-16.3	-9.7
Tomatoes, grape	1.24	2.16	1.53	2.36	24.1	9.2
All vegetables[3]	**123.91**	**--**	**102.22**	**--**	**-17.5**	**--**

Note: The months, January–September, represent year-to-date (YTD) domestic average prices.
1/ Averages exclude imports, domestic only. 2/ Percent change from YTD January–September 2020–21. 3/ Price index with base period of 2011 (the period when the index equaled 100).
Source: USDA, Agricultural Marketing Service, *Fruit and Vegetable Market News*, Shipment Reports and USDA, National Agricultural Statistics Service, *Agricultural Prices*.

Non-organic and Organic Retail Price Comparisons

Advertised retail price data are also available from USDA, Agricultural Marketing Service (AMS). The criteria used to select the specific types of vegetables shown in table 6 were those advertised at over 100,000 stores through the first 3 quarters (January–September) over the past 2 years with both organic and non-organicprices. The select fresh vegetables that yielded the highest per pound, organic price premiums in 2021 were flat baby spinach, tomatoes—both plum and roma—and round green cabbage with organic premiums of 118, 116, and 112 percent over the non-organic prices, respectively. The only highly advertised fresh vegetable that did not yield an organic price premium over the non-organic type was white mushrooms with an advertised retail price 28 percent below the average advertised non-organic white mushroom price in 2021 and 23 percent below the advertised non-organic retail price in 2020.

Table 6. U.S. fresh vegetable advertised retail prices, 2020–21

Selected Commodities	2020		2021		Change 2020–21[1]	
	Non-organic	Organic	Non-organic	Organic	Non-organic	Organic
	Dollars per pound				*Percent*	
Asparagus, green	2.65	3.91	2.66	3.63	0.4	-7.2
Beans, round green (snap)	1.54	2.80	1.60	2.76	3.9	-1.5
Broccoli, crown cut	1.62	2.37	1.52	2.60	-6.5	9.5
Cabbage, round green type	0.55	1.17	0.59	1.25	6.9	6.6
Carrots (unspecified)	0.68	1.34	0.72	1.30	5.3	-2.6
Carrots, baby peeled	1.37	1.69	1.32	1.69	-3.7	0.2
Lettuce (romaine/hearts)	0.86	1.02	0.88	1.07	1.9	5.1
Mushrooms, white	1.37	1.05	1.40	1.00	2.1	-4.5
Onions, dry (red)	0.91	1.61	1.12	1.78	22.7	10.6
Onions, dry (yellow)	0.92	1.65	0.93	1.69	1.0	2.2
Onions, dry (yellow/marked sweet)	1.33	1.59	1.28	1.69	-4.2	6.3
Potatoes, round (red)	1.26	1.57	1.15	1.51	-9.0	-3.3
Potatoes, yellow	1.21	1.61	1.44	1.78	19.2	11.1
Salad mixed types	4.12	6.64	4.18	6.77	1.5	2.0
Spinach flat, baby type	3.26	7.85	3.45	7.53	5.8	-4.1
Squash (yellow crookneck/straightneck)	1.39	1.82	1.30	1.91	-6.7	5.2
Squash, zucchini	1.33	1.97	1.25	1.85	-6.0	-6.2
Sweet potatoes	0.97	1.89	0.95	1.73	-2.1	-8.4
Tomatoes (unspecified)	1.64	2.63	1.71	2.53	4.1	-3.7
Tomatoes, vine ripes (unspecified)[2]	1.85	2.58	1.65	3.24	-11.2	25.9
Tomatoes, vine ripes (on the vine)[2]	1.86	2.78	1.66	2.95	-10.7	5.8
Tomatoes, grape[2]	3.28	4.10	3.63	4.16	10.8	1.3
Tomatoes (plum/roma)[2]	1.18	2.07	1.06	2.30	-10.0	10.7

Note: The months, January–September, represent year-to-date (YTD) average prices.
1/ Percent change from YTD January–September 2020–21. 2/ Includes greenhouse.
Source: USDA, Agricultural Marketing Service, *Fruit and Vegetable Market News* , Retail Reports.

2021 Fresh Vegetable PPI Down, CPI Up Slightly

The Producer Price Index (PPI) for all fresh vegetables (excluding potatoes) reported by the U.S. Department of Labor, Bureau of Labor Statistics (using shipping-point prices) available from January–October 2021 compared with January–October 2020 reveals fresh vegetable producer prices are down by 13 percent. The vegetables contributing to most of the PPI decline through October 2021 are squash (down 30 percent), tomatoes (down 28 percent), and bell peppers (down 26 percent). The fresh vegetable PPI in November–December 2021 is expected to increase in comparison to January–October 2021. However, the November–December 2021 projection is below the November–December 2020 PPI and is expected to decline by 21 percent. If realized, the January–December 2021 PPI will decline by 15 percent compared with January–December 2020 (table 7).

The Consumer Price Index (CPI) for fresh vegetables in November–December 2021 is expected to average slightly above (0.1 percent) November–December 2020. Overall the fresh vegetable CPI for January–December 2021 would increase about 1 percent from January–December 2020 (table 7). However, January–December 2021 consumer prices for lettuce and prepared

salads are expected to rise by 4 and 3 percent, respectively. In contrast, projected CPI declines in potatoes and tomatoes in January–December 2021 are both down by less than 1 percent from January–December 2020.

Table 7. Fresh vegetables: U.S. Consumer and Producer Price Indices, 2020–21

	2020		2021		Change 2020–21[1]		
Price indices - items	Jan. – Oct.	Nov. – Dec.	Jan. – Oct.	Nov. – Dec.[f]	Jan. – Oct.	Nov. – Dec.[f]	Jan. – Dec.[f]
	Index				*Percent*		
Consumer Price Indices (CPI, 1982-84 = 100)							
Food at home	249.9	251.9	257.1	258.7	2.9	2.7	2.8
Food away from home	293.0	298.8	305.5	310.6	4.3	4.0	4.2
Fresh vegetables	345.5	347.6	348.6	348.0	0.9	0.1	0.8
Lettuce, all	329.4	365.6	344.0	373.5	4.4	2.1	4.0
Potatoes	379.9	373.4	376.5	378.9	-0.9	1.5	-0.5
Prepared salads[2]	130.2	130.6	133.8	135.5	2.7	3.8	2.9
Tomatoes, all	354.9	341.1	351.7	340.0	-0.9	-0.3	-0.8
Other vegetables	340.9	345.1	344.9	343.3	1.2	-0.5	0.9
Producer Price Indices (PPI, 12/1991 = 100)							
Fresh vegetables (excluding potatoes) [3]	253.2	298.3	218.7	233.7	-13.6	-21.7	-15.1
Beans, snap	267.4	335.6	238.1	369.3	-11.0	10.0	-6.9
Beets	121.3	115.6	114.7	117.1	-5.5	1.3	-4.3
Broccoli	187.4	289.0	183.8	206.4	-1.9	-28.6	-8.2
Cabbage[3]	262.7	298.7	284.8	272.4	8.4	-8.8	5.2
Carrots[3]	191.1	193.0	196.7	205.5	2.9	6.5	3.5
Cauliflower	81.6	142.9	71.7	83.4	-12.2	-41.6	-19.7
Celery[3]	196.9	298.6	232.7	235.0	18.2	-21.3	9.0
Cucumbers	253.5	264.5	211.3	225.1	-16.7	-14.9	-16.5
Eggplant	395.6	254.5	301.7	252.6	-23.7	-0.8	-20.1
Endive	557.0	805.4	582.2	672.3	4.5	-16.5	-0.2
Greens	187.3	203.5	201.7	200.0	7.7	-1.7	6.0
Lettuce[3]	290.5	429.7	231.2	284.5	-20.4	-33.8	-23.4
Onions, dry[3]	158.5	144.4	158.1	140.9	-0.2	-2.4	-0.6
Peppers, green/bell	448.9	353.7	328.2	296.0	-26.9	-16.3	-25.5
Spinach	514.2	514.9	437.3	443.1	-15.0	-13.9	-14.8
Squash	271.8	219.2	189.9	163.6	-30.1	-25.3	-29.5
Sweet corn	210.7	266.0	211.7	256.6	0.5	-3.5	-0.3
Sweet potatoes	107.0	96.6	97.4	95.6	-9.0	-1.0	-7.8
Tomatoes	395.8	331.2	281.4	271.6	-28.9	-18.0	-27.4

Note: f = USDA, Economic Research Service forecast.
1/ Percent change from the previous year to 2021 for January – October, November – December, and January – December.
2/ Index base is December 2007 = 100. 3/ Index base is 1982 = 100.
Source: USDA, Economic Research Service calculations using U.S. Department of Labor, Bureau of Labor Statistics data.

Processing Vegetables

Heat and Drought Slice Tomato Crop Again

U.S. processing tomato production is projected to decline by 2 percent to 11.6 million short tons in 2021. According to a forecast released August 31 by the California Agricultural Statistics Service, California growers delivered 11.1 million short tons of tomatoes for processing this year—2 percent below 2020. Although processors initially planned for a larger crop, coming from greater area than the year before, area for harvest in the state fell slightly due largely to the ongoing drought and availability of irrigation water. Since reaching a record high in 2018, California's yield per acre has flattened and declined by at least 1 percent from a year earlier to a projected 48.9 tons per acre (table 8 and figure 6). Over the past three seasons, drought, excessive heat, wildfire smoke, and pests have combined to limit California's tomato crop. The 30-year trend (1991–2020) yield for California's 2021 crop was 51.75 tons.

According to preliminary (and incomplete) data from the California Processing Tomato Advisory Board (PTAB), output in California through the week of October 16, 2021 totaled just 10.6 million tons—2 percent below a year earlier. The industry anticipates another 0.5 million tons will be processed in other (largely Midwestern) states. Through the week of October 16, 2021, PTAB data indicate that 19 counties delivered tomatoes for processing In California led by Fresno County with 27 percent of the State's output, followed by Yolo (15 percent), and Kings (13 percent) counties. The late season tomato harvest was effectively ended after heavy rain the weekend of October 24, 2021.

Table 8. California production of processing tomatoes

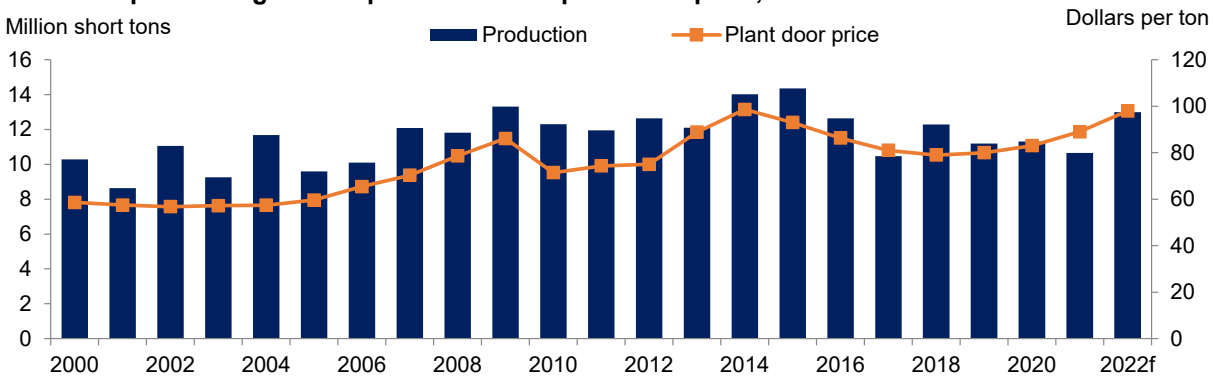
Year	Harvested acres	Yield	Utilized production	Price[1]	Value
	Thousand acres	*Tons per acre*	*Thousand tons*	*Dollars per ton*	*Million dollars*
2000–04	274.2	37.1	10,181.3	57.49	585.4
2005–09	285.8	39.8	11,384.4	73.05	831.6
2010–14	265.4	47.5	12,597.6	82.06	1,033.8
2015–19	248.0	49.2	12,188.5	84.34	1,028.0
2015	296.0	48.5	14,361.0	93.00	1,335.6
2016	258.0	49.0	12,647.0	86.30	1,091.4
2017	222.0	47.1	10,464.0	81.00	847.6
2018	236.0	52.1	12,284.2	79.00	970.4
2019	228.0	49.1	11,186.3	80.00	894.9
2020	228.0	49.6	11,312.3	83.00	938.9
2021f	227.0	48.9	11,100.0	89.00	987.9

Note: Tons are expressed as short (2,000 pounds) tons. f = USDA, Economic Research Service forecast.
1/ Price at the processing plant door. 2021 price and value is projected by ERS.
Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service.

Since 2021 yields and production are less than anticipated and beginning stocks are at low levels, supplies of processed tomato products are lower than in 2020. With domestic demand and exports remaining relatively strong, wholesale prices for tomato products have increased. The price for 31 percent natural tomato soluble solids (NTSS) industrial tomato paste—the base ingredient required to manufacture most sauces, soups, and ketchup—was 28 percent above 2020 prices according to August 2021 data. This was the highest nominal paste price since January 2009 and the highest for August since 1989.

Figure 6

California processing tomato production and plant door price, 2000–22



Note: Ton is a 2,000 pound short ton. f = USDA, Economic Research Service (ERS) forecast. Production for 2021 is preliminary. The 2022 price is an ERS forecast.

Source: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service and Processing Tomato Advisory Board data.

Larger Tomato Crop Likely for 2022

Lower inventories and higher tomato product prices will again set the stage for processor intentions toward a larger crop in 2022. However, in order to attract the needed tonnage, processors may offer growers more attractive contract prices for tomatoes to offset higher production costs caused by the long-term drought and rising input prices. Inputs such as fertilizer and pesticides are critical to attaining the high yields helping growers maintain long-run profitability. Perhaps of greater importance in this coming season will be the California drought and the availability—and cost—of irrigation water. If the predicted La Niña weather pattern limits winter mountain snowpack in California to below average levels, surface irrigation water for the 2022 season could be severely limited and groundwater (where available) pumping costs will rise as water levels continue to drop. Revenue for the average tomato grower has been squeezed by lower yields and sharply higher production costs whereas processor revenues have been limited by higher energy and labor costs.

Frozen Vegetable Stocks Down, Retail Prices Up

Stocks of frozen vegetables (including potatoes) in cold storage warehouses on October 1, 2021, were 5 percent lower than in 2020 (table 9). Although stock levels rose from 2020 for such vegetables as brussels sprouts (up 25 percent), spinach (16 percent), and asparagus (10 percent), double-digit declines from 2020 were noted for onions (down 25 percent), carrots (15 percent), cauliflower (12 percent), and miscellaneous vegetables (17 percent).

Table 9. Frozen vegetables: U.S. cold storage holdings for selected months, 2020–21[1]

Input	2020				2021				2021 Change from:[2]	
	January	April	July	September	January	April	July	September	Jul. 2020	Sep. 2020
	Thousand pounds								*Percent*	
Asparagus	5,936	4,298	7,666	6,435	4,482	3,930	8,470	7,102	-16.2	10.4
Lima beans	30,762	21,005	11,083	24,571	19,940	9,707	5,563	28,737	416.6	17.0
Snap beans	157,106	103,693	136,842	269,699	189,802	129,748	139,605	250,522	79.5	-7.1
Broccoli	75,586	82,128	75,905	72,078	63,554	76,380	78,706	70,551	-10.4	-2.1
Brussels sprouts	13,256	9,172	10,118	9,947	9,234	12,699	12,879	12,411	-3.6	24.8
Carrots	262,482	199,297	139,801	133,882	241,655	202,907	146,076	114,022	-21.9	-14.8
Cauliflower	26,212	28,132	28,570	28,301	30,128	30,049	29,207	25,022	-14.3	-11.6
Sweet corn, cut	510,508	372,483	261,628	648,159	565,079	390,575	280,942	675,492	140.4	4.2
Sweet corn, cob	246,556	177,364	128,561	290,645	237,386	132,735	91,131	307,630	237.6	5.8
Mixed vegetables	52,790	54,632	54,875	63,075	60,686	66,170	68,396	73,938	8.1	17.2
Okra	43,036	25,797	39,287	41,934	28,618	15,071	29,431	39,189	33.2	-6.5
Onions, all	67,871	92,375	77,129	78,285	75,906	74,876	66,936	58,847	-12.1	-24.8
Blackeye peas	1,187	1,499	1,589	1,723	1,346	3,280	2,318	2,300	-0.8	33.5
Green peas	185,946	112,569	341,429	309,867	206,895	138,592	317,105	282,640	-10.9	-8.8
Southern greens	10,403	10,524	14,533	15,930	14,728	10,027	18,428	17,204	-6.6	8.0
Spinach	35,144	43,320	53,806	43,064	50,532	55,944	62,678	50,144	-20.0	16.4
Squash	53,090	39,749	34,347	44,683	53,271	43,391	38,349	47,383	23.6	6.0
Other vegetables	406,680	381,515	363,933	449,473	436,011	356,942	323,887	374,594	15.7	-16.7
Potatoes, french fries	990,553	975,074	867,817	949,379	960,847	920,055	883,685	886,512	0.3	-6.6
Potatoes, other frozen	210,687	217,686	219,902	226,004	200,967	196,067	195,452	204,470	4.6	-9.5
Total	**3,385,791**	**2,952,312**	**2,868,821**	**3,707,134**	**3,451,067**	**2,869,145**	**2,799,244**	**3,528,710**	**26.1**	**-4.8**

1/ Reported stocks in cold storage at the end of the selected month. 2/ Percentage change in September stocks from July and the previous September.

Source: USDA, National Agricultural Statistics Service, *Cold Storage*.

With frozen lower stocks, the Producer Price Index (PPI) for frozen vegetables (excluding potatoes) has been running above 2020 levels and averaged 6 percent above a year earlier during the third quarter of 2021 (table 10). For the year, the PPI is projected to increase by about 5 percent, the most since 2012. Sweet corn (cut-basis), which accounts for one-third of non-potato frozen vegetable stocks, reached a record high on Oct 1 of 2020 but was 2 percent below a year earlier on October 1, 2021.

Table 10. Processed vegetables: U.S. Consumer and Producer Price Indices, 2020–21[1]

Input	2020				2021				4th Q Change[2]	
	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q f	Quarter	Year
	Index								*Percent*	
Consumer Price Indexes (12/97 = 100)										
Processed fruits and vegetables	157.1	163.5	164.0	161.8	163.5	166.4	167.0	166.7	-0.2	3.0
Canned vegetables	173.2	181.9	182.0	179.0	183.6	187.1	189.1	188.8	-0.2	5.5
Frozen vegetables (1982-84 = 100)	201.3	209.2	208.8	206.3	204.9	208.7	208.0	206.2	-0.9	0.0
Dry beans, peas, lentils	182.5	191.6	195.9	189.1	191.7	196.8	197.7	197.0	-0.4	4.2
Olives, pickles, relishes	146.8	147.0	148.0	149.9	150.4	148.7	149.5	151.0	1.0	0.7
Producer Price Indexes (1982 = 100)										
Canned vegetables and juices	183.1	184.4	183.2	185.0	186.2	186.3	188.0	194.1	3.2	4.9
Tomato catsup and sauces[3]	161.1	160.5	159.6	161.7	162.4	163.0	164.0	168.3	2.6	4.1
Other canned vegetables[3]	204.5	209.5	207.6	209.2	211.3	210.8	214.3	222.4	3.8	6.3
Pickles and products	241.1	241.6	242.0	242.7	243.1	244.7	253.2	254.6	0.6	4.9
Canned dry beans	173.0	173.5	173.5	175.1	175.4	175.3	175.4	177.9	1.4	1.6
Frozen vegetables (excluding potatoes)[4]	156.2	156.4	157.0	158.3	159.5	161.5	165.8	166.4	0.4	5.1
Frozen vegetables (including potatoes)	216.2	216.3	217.3	219.3	219.6	219.8	222.4	223.7	0.6	2.0
Frozen potato products[4]	209.5	209.5	210.6	212.7	211.9	210.3	210.3	212.0	0.8	-0.3
Dried/dehydrated fruit and vegetables	239.1	247.8	252.0	252.9	255.4	255.3	252.2	238.5	-5.4	-5.7

Note: f = USDA, Economic Research Service forecast. Q = calendar quarter. 1/ Not seasonally adjusted.

2/ Change in projected fourth quarter 2021 from previous quarter/year. 3/ Index base is 1987 = 100. 4/ Index base is 1990 = 100.

Source: USDA, Economic Research Service using data from U.S. Department of Labor, Bureau of Labor Statistics.

Processed Imports and Exports Up

Due partly to fluctuating exchange rates and rising global competition, the U.S. has been a net importer of processed vegetables for 34 of the past 50 years and was last “in the black” in 2015. Processed vegetable import value exceeded export value by $1.6 billion in 2020 and is likely to exceed that in 2021. During the first 9 months of 2021 (January–September), the value of all processed vegetable imports rose 13 percent to $4.3 billion (table 11). Most processed imports entered from Canada, Mexico, and China. The following import value comparisons with January–September 2020 were noted:

- Canned (prepared/preserved), increased by 13 percent to $1.5 billion, led primarily by mushrooms, peppers, and tomato products. Tomato products will likely continue as a major import driver in the coming year given the small 2021 crop and shrinking domestic inventories;
- Frozen vegetables, up 11 percent to $2.1 billion, driven largely by french fries and other frozen potato products. Like tomato products, the drought-shortened the 2021 potato crop and higher prices will continue to enlarge the relatively recent U.S. deficit in global frozen potato trade; and
- Dried and dehydrated vegetable imports, up17 percent to $706 million powered largely by potato products, including chips, flakes, and starches.

Over the same 9-month period, U.S. processed vegetable exports rose by 15 percent to $2.9 billion (table 11).

Table 11. Selected U.S. processed vegetable trade value, 2018–21

Item	2020 Annual	January – September 2018	2019	2020	2021	Change 2020–21
	Million dollars					*Percent*
Imports						
Canned (prepared/preserved)	1,777	1,151	1,112	1,285	1,457	13
Tomatoes	310	157	170	225	239	6
Artichokes	124	99	98	87	94	8
Peppers, all	114	94	81	79	98	24
Mushrooms	118	83	87	85	111	30
Juices (including tomato)	62	56	51	45	58	27
Frozen	2,582	1,702	1,725	1,900	2,114	11
Potatoes	1,064	716	710	783	951	21
Broccoli	381	263	270	287	289	1
Cauliflower	92	46	56	68	60	-13
Dried and dehydrated[1]	691	592	577	603	706	17
Starches	196	156	162	156	171	9
Potato flakes and granules	176	115	118	134	149	11
Potato chips	115	67	77	85	112	32
Garlic, dried/dehydrated	19	40	17	15	12	-20
Selected total imports	**5,050**	**3,445**	**3,415**	**3,789**	**4,277**	**13**
Exports						
Canned (prepared/preserved)	1,646	1,354	1,212	1,212	1,385	14
Tomatoes	1,177	920	929	862	1,019	18
Sweet corn	86	80	72	64	60	-6
Cucumbers	46	51	56	33	49	48
Juices (including tomato)	44	44	31	28	39	38
Frozen	1,317	1,130	1,173	949	1,144	21
Potatoes	1,021	865	925	733	918	25
Sweet corn	95	81	79	69	76	10
Dried and dehydrated[1]	512	367	371	378	398	5
Potato chips	186	142	137	134	148	10
Potatoes, dried/dehydrated	135	89	101	101	94	-7
Onions, dehydrated	82	61	59	62	64	3
Selected total exports	**3,476**	**2,851**	**2,756**	**2,538**	**2,927**	**15**

1/ Includes potato chips for the purposes of this table. Excludes soybeans and dry pulses.

Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census.

Export values for the canned, frozen, and dehydrated categories were each above those of 2020. In terms of value, the top three export markets for all processed vegetables in 2020 were Canada (28 percent), Japan (15 percent), and Mexico (14 percent). The following export value comparisons with a year earlier were noted:

- Canned (prepared/preserved), up 13 percent to $1.5 billion, led primarily by tomato products, cucumber pickles, and juices. Despite the short crop, the United States remains the global leader in processed tomato output and exports. In the year ahead, exporters will likely try to maintain their long-term international markets, while allowing imports to backfill any holes in domestic markets;

- Frozen vegetables, increased by 21 percent to $1.1 billion, driven largely by french fries and sweet corn. Like tomato marketers, potato-product exporters will serve their international markets, while imports continue to fill in for the drought-shortened 2021 potato crop. Through September of 2021, exports to Japan, which accounted for 23 percent of U.S. frozen vegetable exports, rose by 4 percent. Frozen exports were also higher for the second and third most important markets, Mexico (up 90 percent from 2020) and Canada (up 3 percent from 2020). Mexico's import surge reflects increased french fry and other frozen potato product purchases; and
- Dried and dehydrated vegetables, up 5 percent to $398 million has been largely powered by potato chips and dehydrated onion powder and flakes. Among the top three U.S. markets for dried and dehydrated vegetables so far in 2021, the value of U.S. products shipped to Canada were unchanged, while exports to Japan—the second leading market—declined by 2 percent. The value of dried and dehydrated exports to Mexico—the third leading market—rose by 15 percent largely due to gains in potato flakes and starches.

Mushrooms

Sales Value and Volume Decline in 2020/21

The farm value of all mushroom (Agaricus and others) sales during the July 2020 – June 2021 marketing year, totaled $1.064 billion, down by 8 percent from MY 2019/20 (table 12). Total mushroom sales fell by 7 percent to 758 million pounds, reflecting interruptions and slowdowns in both the production cycle and foodservice demand during the height of the COVID-19 pandemic. A 3-percent drop in total area filled with Agaricus mushrooms was reinforced by a 5-percent decline in yield per square foot. Yield fell to 5.63 pounds per square foot, the third consecutive reduction in mushroom productivity since the all-time high of 6.91 pounds in the 2017/18 MY. Most of the decline since the 2017/18 season was realized over the past 2 seasons, both of which were negatively affected by labor and market disruptions caused by the COVID-19 pandemic. Sales of brown mushrooms—including Portabello and Crimini varieties—rose by 2 percent and now account for 26 percent of total Agaricus sales volume.

Table 12: Mushrooms sales volume, price, and sales value

	--- Volume of sales ---		---------- Price ----------		----- Value of sales -----	
Item	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21
	------ 1,000 pounds ------		*--- Dollars per pound ---*		*---- 1,000 dollars ----*	
Agaricus	**796,362**	**737,413**	**1.36**	**1.35**	**1,085,850**	**997,736**
White[1]	607,659	544,738	1.30	1.28	789,711	696,138
Brown[2]	188,703	192,675	1.57	1.57	296,139	301,598
All Specialty	**20,005**	**20,574**	**3.37**	**3.21**	**67,446**	**66,113**
Shitake	7,013	7,210	3.44	3.44	24,091	24,836
Oyster	8,517	6,708	2.70	2.24	23,032	15,003
Other	4,475	6,655	4.54	3.95	20,323	26,273
Total	**816,367**	**757,987**	**1.41**	**1.40**	**1,153,296**	**1,063,849**

Note: The marketing year for mushrooms begins in July and ends in June of the following year.
1/ USDA, Economic Research Service derives white mushroom statistics using the total Agaricus and Brown statistics. 2/ Includes Portobella and Cremini.
Source: USDA, National Agricultural Statistics Service, Mushrooms.

The sales volume of fresh-market Agaricus mushrooms declined 7 percent to 737 million pounds in 2020/21. From 2010–19, 90 percent of all Agaricus sales have consisted of fresh-market volume. Most of the decline in 2020/21 sales likely occurred during calendar-year 2020 since industry first-handler shipment data show domestic fresh volume increased by 2 percent for the first 8 months of calendar-year 2021. Reported fresh shipments from handlers operating out of industry leader Pennsylvania continue to lead the way, with California's volume for January-August 2021 remaining below that of the same period in 2020.

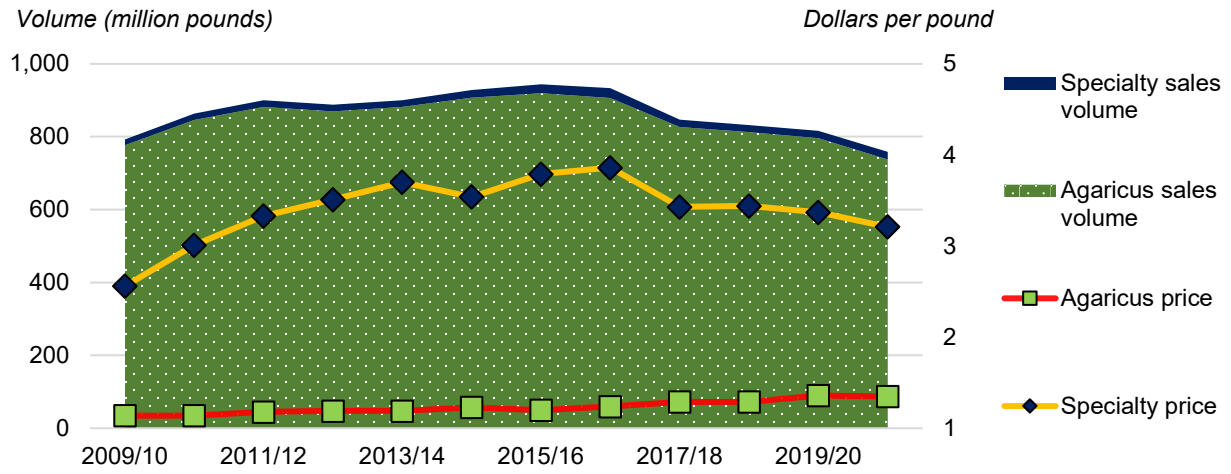
On the processing side, the pandemic-influenced interest in home-prepared meals may have helped spur retail demand for mushroom packs and prepared meals containing processed mushrooms. Partly as a result, domestic Agaricus processed volume increased by 20 percent

from 2019/20 to nearly 67 million pounds. Despite the slight resurgence in 2020/21 marketing year, the long-run trend in domestic mushroom processing likely remains on a downward slope.

With fresh market demand picking up as COVID-19 pandemic restrictions receded, gaps in domestic output were filled in by a 6-percent gain in import volume. The gain in fresh imports consisted of Agaricus (up 9 percent) as specialty volume—a commodity popular within the pandemic-embattled restaurant industry—declined by 13 percent. Canada accounted for 70 percent of the fresh mushroom import volume, followed by Mexico (18 percent), and China (6 percent). Imports of processed mushrooms continued to trend higher in 2020/21 MY as frozen volume rose 6 percent, canned imports rose 18 percent, and dried/dehydrated import volume (largely from China) increased 36 percent.

The average reported price for all mushroom sales in 2020/21 MY was $1.40 per pound, down about 1 percent from the 2019/20 MY (figure 7). With the domestic supply of fresh-market mushrooms lagging demand, the average price at the point of first sale (grower price) rose 1 percent to $1.41 per pound. At retail, the average advertised retail price for an 8-ounce package of fresh conventionally grown white button mushrooms increased by 1 percent to $1.92 in 2020/21. The average certified organic white button mushroom retail price fell by 3 percent to $2.64 per 8-ounce package.

Figure 7
Mushroom sales volume and price, 2009/10 – 2020/21[1]



Note: The marketing year for mushrooms begins in July and ends in June of the following year.
Source: USDA, National Agricultural Statistics Service, *QuickStats* and *Agricultural Prices*.

Meanwhile, reflecting the rising domestic output and greater imports, the unit value of mushrooms available for processing fell by 6 percent to 67.8 cents per pound. The 2020/21 MY

price reduction was a return to the longer-run nominal price trend after the pandemic-inspired surge in 2019/20 MY.

The volume of mushrooms produced as certified organic in 2020/21 increased by 3 percent to 131 million pounds. Certified organic mushroom supply continues to far outstrip demand with just 55 percent of available organic volume sold as organic mushrooms—with the USDA certified organic label—down from 62 percent a year earlier. Specialty (non-Agaricus) mushrooms accounted for 8 percent of certified organic sales, with the remainder being Agaricus. The share of all mushroom sales volumes consisting of certified organic products remained just under 10 percent in 2020/21.

In line with reduced production and still-recovering foodservice demand, per capita availability of all mushrooms declined by 6 percent to 3.53 pounds in 2020/21. Fresh-market use fell by 7 percent to 2.58 pounds per person—13 percent below the 2015/16 record high. Per capita availability of processing mushrooms remained flat at 0.95 pounds but are expected to continue trending lower from the 1994/95 peak of 2.00 pounds as consumers continue to move away from processed products.

Potatoes

Heat and Drought Reduce Output

According to USDA's November Crop Production report, the 2021 U.S. potato crop decreased by 2 percent from 2020 across 14 surveyed States—the fourth consecutive annual decline (table 13). Drought combined with excessive heat during summer 2021 has slashed per-acre yields in key production States. National potato yield averaged 438 hundredweight per acre, down by 5 percent from 2020's record high. Yields were reduced in four of the top five potato-producing States. Reductions in the top two potato-producing States—Idaho (down 7 percent) and Washington (down 9 percent)—were most noteworthy for the impact on national supplies and prices. Idaho and Washington account for 55 percent of national potato output. Yields in Maine, the eighth leading potato-production State, rebounded 30 percent from 2020's extreme drought to a record high in 2021. Although national yields are down, potato yield has enjoyed a strong upward trend with 2021's reduced level being the lowest since only 2017/18.

Table 13. U.S. potato area, yield, production, price and crop value, 2000–21

Year	Harvested acres	Yield	Total production	Price[1]	Crop value
	Thousand acres	*Cwt per acre*	*Million cwt*	*Dollars per cwt*	*Million dollars*
2000–04	1,250.0	372	464.7	6.00	2,786.8
2005–09	1,083.9	398	431.4	7.82	3,371.6
2010–14	1,070.3	409	437.4	9.21	4,028.9
2015–19	1,021.0	436	444.9	9.17	4,077.8
2015	1,070.9	419	448.6	8.79	3,941.8
2016	1,037.7	434	450.3	9.08	4,090.7
2017	1,044.5	432	450.9	9.17	4,133.1
2018	1,014.8	443	450.0	8.90	4,006.3
2019	937.3	453	424.4	9.94	4,217.3
2020	911.7	461	420.0	9.30	3,906.8
2021f	942.3	438	413.2	10.60	4,379.5

Note: f = USDA, Economic Research Service forecast. Cwt is hundredweight, a unit of weight equal to 100 pounds.
Cwt per acre = 100 pounds per acre. Million cwt = million hundredweight, a weight equal to 100,000,000 pounds.
Dollars per cwt = dollars per 100 pounds.
1/ Grower return from all sales modes.
Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service.

In spring 2021, with world demand continuing to recover from the COVID-19 pandemic, the potato industry was anticipating greater production following two below-average crops in 2019 and 2020. Production during each of these previous 2 years averaged 6 percent below the previous 5-year average. In response, potato growers seeded 4 percent more area in spring 2021. The majority of the increased seeding is intended for processing since domestic and international demand for key processed products such as frozen french fries was trending to

pre-pandemic levels. According to the USDA, NASS 2017 Census of Agriculture, States currently excluded from the national potato estimates program account for an additional 9 percent of harvested area. About two-thirds of this excluded area is earmarked for processing, with chipping plants a likely major destination. Thus, assuming an average yield close to 2021's projection, an additional 40–50 million hundredweight of potatoes—in addition to the States surveyed by USDA, NASS—may be available to various local markets, with a third of this volume available as table stock.

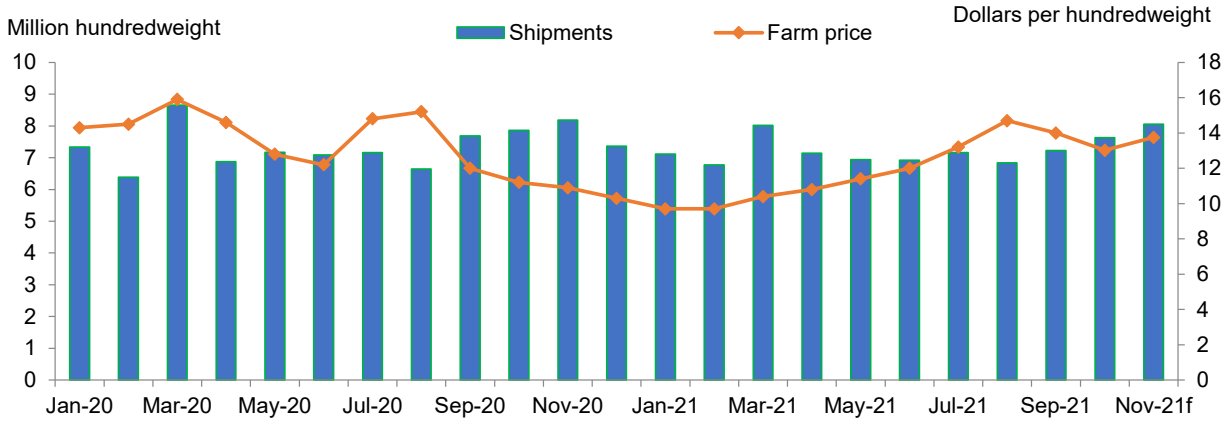
Record High Prices Expected in 2021/22

In the September 2020–August 2021 marketing year, the season-average price was $9.30 per hundredweight, down 6 percent from MY 2019/20. For MY 2021/22, supply and demand factors are in place for higher U.S. potato prices. Factors include a smaller U.S. crop, strong North American processing demand, and surging international demand boosting both U.S. export demand and prices for imported potato products. As a result, the 2021/22 U.S. season-average potato price is expected to reach a nominal dollar record high—exceeding $10.00 per hundredweight for the first time—as potato supplies tighten and processors siphon volume from the fresh market.

Prices for fresh table stock potatoes are expected to rise above the recent highs seen in 2019 ($13.60 per hundredweight) and could approach or exceed the record 2008 fresh-market average of $14.44 per hundredweight. In September 2021, the all-potato price (fresh and processing) was reported to be $14.00 per hundredweight, up 17 percent from a year earlier (figure 8).

Figure 8

U.S. monthly fresh potato shipments and price, 2020–21



Note: f = USDA, Economic Research Service forecast. Hundredweight, a unit of weight equal to 100 pounds. Million hundredweight = 100,000,000 pounds. Dollars per hundredweight = dollars per 100 pounds.

Source: USDA, Economic Research Service using data from USDA, Agricultural Marketing Service, *Fruit and Vegetable Market News.*

Some offset to this price strength is expected from rising imports from Canada as ideal growing weather in eastern provinces offset drought-reduced output in the west, leading to a record crop in Canada. The smaller U.S. crop is expected to result in higher retail prices, especially for russets (table 14).

Table 14. Potatoes: U.S. Consumer and Producer Price Indices and advertised retail prices, 2020–21[1]

Item	2020				2021				4th Q Change[2]	
	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q f	Quarter	Year
	Index								*Percent*	
Producer Price Indexes										
Fresh tablestock (2011=100)	139.8	122.1	128.1	106.6	100.7	99.9	132.5	131.6	-0.7	23.5
Fresh, russet (1991=100)	229.8	192.1	221.6	169.7	154.5	160.0	209.6	220.9	5.4	30.1
Fresh, red (1991=100)	265.8	261.5	213.9	196.5	181.7	174.8	216.4	196.8	-9.0	0.1
Fresh, round white (1991=100)	229.4	248.6	161.4	250.6	239.8	189.6	259.9	206.0	-20.7	-17.8
Fresh, round yellow (9/2015=100)	159.2	--	128.6	155.9	136.8	135.2	136.8	110.0	-19.6	-29.4
Frozen products (1982=100)	263.8	263.8	265.1	267.8	266.8	264.8	264.8	267.0	0.8	-0.3
Potato chips and sticks (2007=100)	125.4	125.3	125.3	125.7	126.7	126.9	127.3	131.3	3.1	4.5
Consumer Price Indexes										
Fresh tablestock (1982–84=100)	371.1	392.9	390.7	360.7	374.4	377.7	388.7	370.8	-4.6	2.8
Retail Prices [4]										
Fresh potatoes, white	0.79	0.85	0.84	0.77	0.78	0.77	0.79	0.79	0.3	3.1
Potato chips	4.57	4.98	5.07	5.07	5.01	5.01	5.06	5.30	4.8	4.6
Retail Prices (advertised)[5]										
Fresh, russet	0.486	0.504	0.502	0.468	0.506	0.477	0.479	0.460	-4.0	-1.6
Fresh, red	0.688	0.706	0.683	0.630	0.639	0.647	0.651	0.640	-1.7	1.7
Fresh, yellow	0.645	0.733	0.688	0.640	0.689	0.655	0.662	0.620	-6.4	-3.0
Fresh, round white	0.549	0.597	0.565	0.536	0.529	0.706	0.563	0.540	-4.0	0.7

Note: Q = calendar quarter. f = USDA, Economic Research Service forecast. 1/ Not seasonally adjusted. 2/ Change in projected fourth quarter 2021 from the previous quarter/year. 3/ Index base year is 1982 = 100. 4/ As reported by the U.S. Department of Labor, Bureau of Labor Statistics. 5/ Average of weekly advertised retail prices as reported by Market News per pound for 5-lb bags (non-organic).
Source: USDA, Economic Research Service using data from USDA, Agricultural Marketing Service, Market News Service and U.S. Department of Labor, Bureau of Labor Statistics.

Prices for processing potatoes have long exhibited slow, steady growth, and provided growers with a strong foundation for potato demand and pricing. However, given the pre-determined nature of processing pricing—largely set by contract—prices for potatoes destined for processing have frequently stood in stark contrast to those for fresh open-market pricing, which have shown more variation.

In marketing years such as 2021/22, when processors have found themselves with fewer potatoes than required to satisfy demand, they may purchase fresh potatoes from the open market—focusing largely on varieties which suit their processing need—to supplement potatoes under contract. Processors buying from the open market can result in upward pressure on fresh table stock prices. This is the scenario expected in 2021/22 MY assuming no widespread resurgence of pandemic restrictions impacting demand. In other years, processors may have too many potatoes under contract, so they sell some of their stored potatoes for use as table stock. Depending on the volume, this can have a negative effect on fresh market prices.

Outlook for 2022/23 Points to Increased Area

Expectations for strong potato prices in the 2021/22 MY will serve as a driver of projected planted area for the 2022/23 potato crop to be planted in the spring of 2022. As seen in MY 2021/22, even with a modest increase in planted area, weather ultimately plays the key role in crop determination. Assuming average weather in 2022 and favorable irrigation water supplies, the 30-year national trend yield would be close to the record-high 461 hundredweight per acre returned for the 2021/22 crop. Given trend yields, lower competing field-crop prices, and a positive acreage response to higher 2021/22 potato prices, the outlook for 2022/23 points to a larger crop and easing table potato prices.

Price negotiations with processors have already commenced and will likely be another key driver for the 2022 crop. Three factors driving contract pricing for the 2022/23 MY are the short 2021/22 crop—resulting in lower beginning inventories of finished products—strength in domestic and international demand, and agricultural input price inflation. Given large price increases for energy-based inputs (i.e., fuel, fertilizer, and agricultural chemicals), labor, and most other inputs as well as the subsequent effect on producing an acre of potatoes, potato growers are seeking a substantial escalation in contract prices for raw potatoes. Thus, the average price of potatoes destined for processing could potentially see the strongest year-to-year gain since 2009.

Export and Import Value Each Record High

During the September 2020 – August 2021 marketing year, U.S. exports of all potatoes and potato products (including starch but excluding dextrins) totaled a nominal dollar record $1.89 billion—up 9 percent from a year earlier. Export volume increased for each product category (frozen, chip, dehydrated, seed) except for dried/dehydrated potatoes (table 15). With a surge in frozen potato demand, Mexico (21 percent of potato export value) supplanted Japan as the top export market for U.S. potato products in MY 2020/21. The volume of U.S. frozen potato exports to Mexico doubled in MY 2020/21, with value rising by 89 percent to $263 million and accounting for 67 percent of all potato product exports to Mexico. The other top potato export markets for MY 2020/21 were Japan (19 percent of export value), Canada (17 percent), South Korea (7 percent), and the Philippines (5 percent).

Despite strong export growth, the United States remained a net potato importer in 2020/21 in terms of both volume and value. During the September–August 2020/21 marketing year, U.S. imports of all potatoes and potato products totaled a nominal dollar record $1.96 billion—15

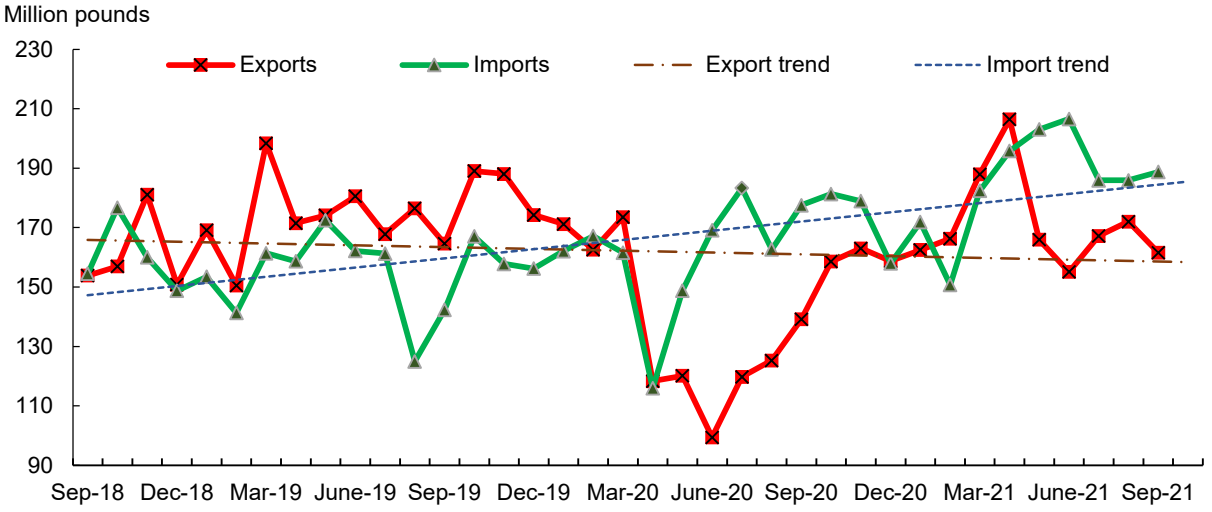
percent above a year earlier. Import volume increased for each product category (frozen, chip, dehydrated, seed) except for fresh potatoes (table 15).

Table 15. U.S. potato trade volume, product-weight[1]

Commodity	September – August 2016/17	2017/18	2018/19	2019/20	2020/21	Change 20/21–21/22
	Thousand hundredweight					*Percent*
Exports						
Fresh	10,946	9,880	11,709	10,218	12,077	18
Frozen, all	22,709	22,422	22,991	20,518	23,111	13
French fries	20,210	19,879	20,311	18,063	20,029	11
Other frozen	2,500	2,543	2,680	2,455	3,081	26
Chips	1,126	1,075	1,076	993	1,125	13
Dried, dehydrated, starch	2,192	2,024	2,124	2,267	2,046	-10
Other prep/preserved	809	896	960	962	972	1
Seed	1,107	385	621	656	751	14
Total[1]	**38,889**	**36,682**	**39,481**	**35,614**	**40,081**	**13**
Imports						
Fresh	9,387	9,261	7,391	9,042	8,976	-1
Frozen, all	20,447	22,083	21,446	22,949	25,963	13
French fries	18,497	19,821	18,758	18,940	21,779	15
Other frozen	1,950	2,262	2,688	4,009	4,184	4
Chips	393	453	526	570	699	23
Dried and dehydrated	4,169	4,621	4,638	5,257	5,970	14
Seed	1,657	1,533	1,544	1,549	1,607	4
Total[1]	**36,053**	**37,951**	**35,545**	**39,367**	**43,215**	**10**

Notes: Thousand hundredweight is a weight equal to 100,000 pounds. Years represented are marketing years which begin in September and end in August of the following year. 1/ Total volume is in terms of product weight.
Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census.

Figure 9
U.S. frozen french fries: Export and import volumes, 2018/19–2020/21



Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census.

Canada remained the top foreign supplier with 75 percent of the total value, followed distantly by Mexico (5 percent), Belgium (5 percent), and the Netherlands (5 percent). Mexico's exports to the United States consist mostly of potato granules (81 percent) and potato chips (18 percent). Imports from Belgium consist largely of frozen french fries and other frozen products, which enter eastern ports and largely serve the growing cadre of European food retailers. Imports from the Netherlands focus on potato starches (43 percent) and frozen products (35 percent). U.S. frozen french fry imports continued to trend upward in the 2020/21 MY (figure 9).

Utilization of the 2020 Crop

With a smaller potato crop available, sales from the 2020 crop slightly lagged those of a year earlier, totaling 392 million hundredweight, 1 percent below the 2019/20 level and 5 percent below the average of the previous years. With prices for fresh and processing potatoes averaging a relatively low $11.90 and $8.07 per hundredweight, respectively, sales from the 2020 crop were valued at $3.65 billion—down 7 percent from 2019/20.

Table 16. Utilization of U.S. potatoes, 2016–20[1]

Utilization category	2016/17	2017/18	2018/19	2019/20	2020/21	Change 2019/20–2020/21
	Million hundredweight					*Percent*
Sales, all seasons[2]	**419.0**	**421.4**	**420.4**	**394.8**	**392.0**	**-1**
Table stock	114.2	109.8	106.5	97.9	101.2	3
Processing[3]	**285.9**	**282.1**	**298.3**	**283.3**	**279.8**	**-1**
Frozen french fries	157.0	155.8	163.1	162.4	155.6	-4
Other frozen	12.7	13.8	16.0	11.8	11.0	-7
Chips	60.3	58.8	62.7	59.6	59.2	-1
Dehydrated	48.0	45.8	49.1	41.6	44.9	8
Canned	1.9	1.9	1.9	1.7	2.6	50
Other	6.0	6.2	5.6	6.0	6.5	8
Other sales	**28.0**	**27.1**	**24.8**	**21.2**	**20.6**	**-3**
Seed	26.8	25.2	24.1	19.7	19.4	-1
Feed	1.2	1.9	0.7	1.5	1.2	-23
Non-sales	**31.3**	**29.8**	**29.6**	**29.6**	**28.0**	**-5**
Seed, feed, on-farm use	4.4	4.7	4.0	4.6	4.6	-1
Shrinkage and loss	26.9	25.1	25.5	25.0	23.5	-6

Note: Hundredweight is a unit of weight equal to 100 pounds. Million hundredweight = 100,000,000 pounds.

1/ The potato marketing year begins with harvest in the indicated year and ends in August of the following year.

2/ Sales excludes processing volume from outside USDA, National Agricultural Statistics Service (NASS) estimating States.

3/ Processing includes some potatoes used by processors that originated from outside the USDA, NASS program States.

Source: USDA, National Agricultural Statistics Service.

Given pandemic-stimulated demand for home-prepared meals, the USDA Food Box Program, and relatively low prices, sales of fresh table stock potatoes, which have trended lower for decades, increased by 3 percent from 2019/20 to 101.2 million hundredweight.

According to the U.S. Department of Labor, Bureau of Labor Statistics, retail prices for all fresh potatoes sold for an average of 77.6 cents per pound during marketing year 2020/21, 5 percent below the 2019/20 marketing year. Nearly two-thirds of the 2020 potato crop was used for processing—similar to the previous years. Some key observations on 2020/21 processing utilization include:

- Utilization as frozen french fries declined by 4 percent but still accounted for 56 percent of all potatoes processed in 2020 despite reduced domestic and international foodservice sales;
- The 90 U.S. manufacturing plants making traditional potato chips and shoestring potatoes utilized 1-percent fewer potatoes in 2020/21 than in 2019/20;
- Utilization for dehydration rose by 8 percent partly because of pandemic-influenced hoarding of shelf-stable products like dehydrated mashed potatoes and increased potato chip demand from home-bound consumers (many chip products are made from reconstituted dehydrated potatoes);
- Canning utilization has been trending downward for decades but registered a sharp 50-percent gain in 2020 as renewed demand for shelf-stable soups and stews emptied store shelves and exhausted pipeline inventories; and
- Another indication of the quality issues experienced with the 2020/21 fall potato crop was the 6.5 million hundredweight sold as feed. During the last 2decades, around 3 million hundredweight of potatoes have been annually sold for feed.

Coronavirus Food Assistance Program Payments

USDA's Farm Service Agency is administering the Coronavirus Food Assistance Program (CFAP) to provide direct relief to producers who faced price declines and additional marketing costs due to COVID-19. CFAP provides vital financial assistance to producers of agricultural commodities with financial assistance that gives them the ability to absorb sales losses and increased marketing costs associated with the COVID-19 pandemic. Under the initial CFAP implementation known as CFAP 1, U.S. potato growers have received $142.4 million in direct payments through mid-November broken out as follows:

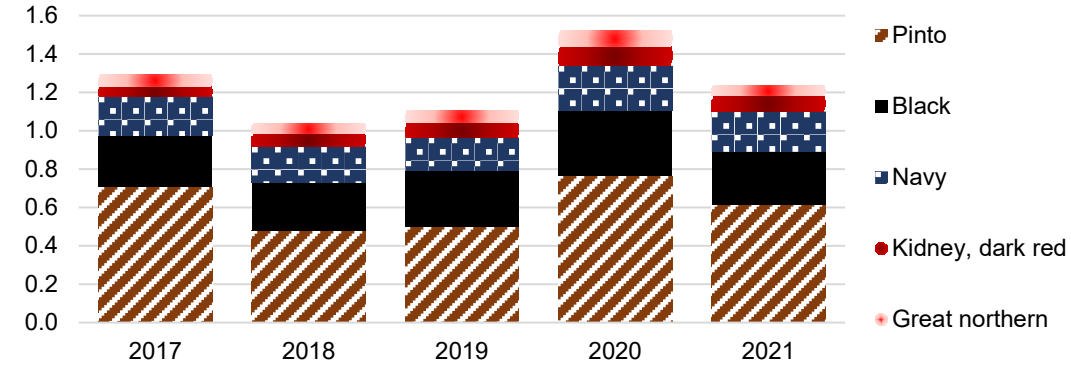
- russet potatoes, $96.2 million;
- other fresh potatoes, $11.8 million;
- processing potatoes, $18.4 million; and
- seed potatoes, $16.0 million.

Dry Edible Beans

Drought Drops Dry Bean Production in 2021

According to USDA, NASS's *Crop Production* reports, 2021 planted area for dry edible beans (excluding chickpeas) declined by 20 percent from 2020 with planted area levels akin to the 2017 crop. Pinto, black, and dark red kidneys are each down 19 percent while navy beans are down 12 percent from 2020 (figure 10).

Figure 10
Dry bean planted area by major class, 2017–21



Source: USDA, National Agricultural Statistics Service, *QuickStats* and *Crop Production Summary*.

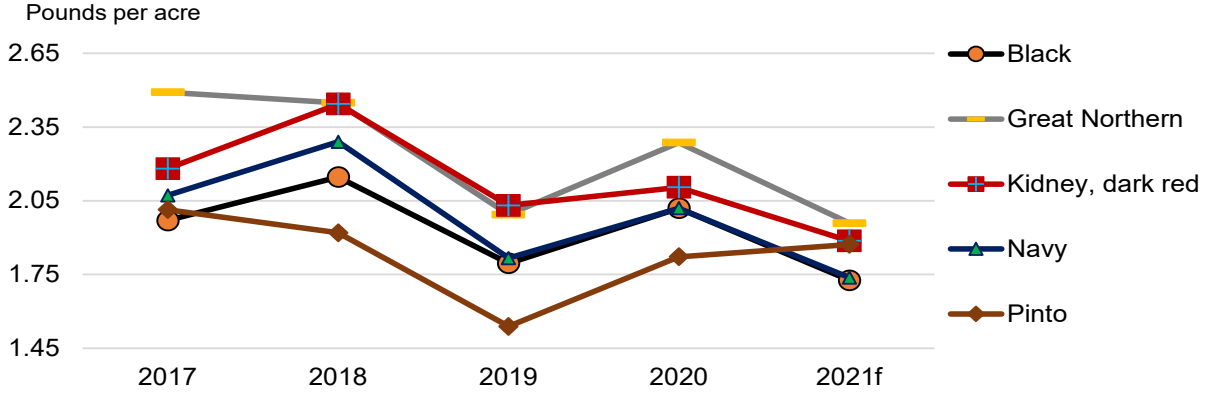
Overall, dry bean production is down 31 percent from 2020 as nearly every dry bean producing State reported production declines from 2020 with the most significant production declines within the top three dry bean producing States, North Dakota, Michigan, and Minnesota reflecting both lower acreage and generally lower yields (table 17). Production and yield estimates, by class, for 2021 are not yet available but USDA, ERS forecasts the greatest production declines, by class, for 2021 are pintos, navy, and dark red kidney beans. Both pinto and navy beans are predominantly grown in North Dakota though Michigan navy bean production is a close second. Dark red kidney beans are predominantly grown in Minnesota. Yield forecasts for 2021 are projected to decrease for black, great northern, and dark red kidney beans while the pinto-bean yield will increase slightly (figure 11).

Table 17. Dry bean production, 2018–21[1]

Commodity	2018	2019	2020	2021f	Change 2020–21
	---------- *Million Pounds* ----------				*---- Percent ----*
Dry bean classes					
Black	5,212	5,063	6,693	4,538	-32.2
Blackeye	528	268	354	308	-13.1
Cranberry	244	158	129	142	10.1
Dark red kidney	1,625	1,444	2,069	1,374	-33.6
Great northern	1,188	1,027	1,777	1,068	-39.9
Light red kidney	897	910	1,307	833	-36.3
Lima, baby	275	289	217	209	-3.7
Lima, large	234	200	268	188	-29.9
Navy	4,191	2,982	4,505	3,123	-30.7
Pink	398	288	316	268	-15.2
Pinto	8,778	6,803	13,414	7,755	-42.2
Small red	701	574	967	600	-38.0
Small white	155	113	151	112	-25.8
Other	6,391	637	796	2,093	162.9
Total	**30,817**	**20,756**	**32,963**	**22,609**	**-31.4**
Dry bean States					
California	1,190	729	695	360	-48.2
Colorado	647	610	1,069	582	-45.6
Idaho	1,256	1,067	1,592	1,595	0.2
Michigan	4,635	3,663	6,033	5,408	-10.4
Minnesota	4,200	4,017	5,525	4,466	-19.2
Nebraska	3,254	1,879	3,607	2,786	-22.8
North Dakota	8,929	7,713	12,794	5,952	-53.5
Washington	677	688	1,120	1,107	-1.2
Wyoming	605	390	528	353	-33.1
Montana[2]	5,214	--	--	--	--
Texas[2]	210	--	--	--	--
Total	**30,817**	**20,756**	**32,963**	**22,609**	**-31.4**

Note: f = USDA, Economic Research Service forecast by class. 1/ Excludes garbanzo beans.
2/ Production in Montana and Texas are no longer reported.
Source: USDA, Economic Research Service, 2021 dry beans class forecast, and USDA, National Agricultural Statistics Service, *QuickStats* and *Crop Production Summary*.

Figure 11
Dry bean yield by major class, 2017-21[1]



1/ Excludes chickpeas.
Source: USDA, National Agricultural Statistics Service, *QuickStats* and *Crop Production Summary*.

Dry Bean Exports Up, Imports Down

The U.S. is a net exporter of dry beans with most U.S. dry bean exports sent to Mexico and Canada. Pinto exports in the 2020/21 MY grew by 68 percent from 2019/20. However, in terms of volume—pinto beans were the largest bean class increase from 109 to 183 million pounds from 2019/20 – 2020/21 (table 18). Other bean classes reported gains over 100 percent—small reds up by 157 percent and mung beans up by 106 percent but their combined proportion (6 percent) of total dry bean export volume are smaller than the pinto bean proportion (21 percent) of total dry bean export volume.

Table 18. U.S. dry bean marketing year export volume

Commodity	September–August 2018/19	2019/20	2020/21	Change 2019/20 – 2020/21
	Million pounds			*Percent*
By class				
Black	105.4	163.9	194.7	18.8
Pinto	112.7	109.2	183.2	67.8
Dark red kidney	139.2	154.2	152.9	-0.9
Navy	155.7	142.1	118.9	-16.3
Small red	21.4	21.1	54.2	156.9
Light red kidney	30.5	26.0	27.8	6.7
Great northern	51.0	17.3	16.8	-2.8
Lima, all	24.4	20.7	13.1	-36.6
Cranberry	5.0	9.6	7.1	-26.0
Mung	4.3	2.8	5.7	106.4
Small white	4.4	2.8	5.0	80.7
Pink	4.6	3.6	4.6	26.5
Other[1]	131.5	91.8	164.0	78.7
Total	**790.0**	**764.9**	**947.9**	**23.9**
All by destination				
Mexico	167.5	183.4	355.4	93.7
Canada	121.6	76.8	95.0	23.7
Italy	99.0	87.8	89.6	2.1
Dominican Republic	54.3	73.8	88.6	20.2
United Kingdom	74.9	64.2	61.9	-3.6
Costa Rica	5.6	26.1	36.8	40.7
Haiti	26.1	35.9	30.4	-15.4
Germany	10.9	7.9	11.9	50.2
Other	230.1	208.9	178.2	-0.1
Total	**790.0**	**764.9**	**947.9**	**23.9**

[1]Excludes garbanzo beans.

Source: U.S. Department of Commerce, Bureau of the Census.

U.S. imports of mung beans remain the most predominant class of dry bean imported, and 2020/21 MY mung bean imports increased 19 percent from the 2019/20 MY. In MY 2020/21, imports originated mostly from Canada and India. A substantial decline in imports from Mexico

(down 47 percent) and India (down 10 percent) contributed to the 4 percent decline in dry bean imports compared to the 2019/20 MY. Dry bean imports from Peru increased by 54 percent from the previous year and are steadily increasing for the past 3 years (table 19).

Table 19. U.S. dry bean marketing year import volume[1]

Commodity	2018/19	2019/20	2020/21	Change 2019/20 – 2020/21
	Million Pounds			*Percent*
By class				
Mung	44.2	66.6	79.3	19.1
Black	25.9	36.8	32.7	-11.1
Pinto	15.6	27.8	22.6	-18.8
Light red kidney	16.3	22.2	19.3	-13.1
Small red	13.7	19.6	16.0	-18.1
Blackeye	15.8	13.1	13.2	1.4
Lima	0.7	1.1	7.6	598.8
Dark red kidney	3.6	4.0	5.0	27.4
Navy	7.5	3.2	3.1	-3.5
Great Northern	1.4	6.6	3.0	-54.7
White	1.3	2.5	2.2	-10.5
Lima, baby	0.9	0.6	1.2	102.7
Other dry beans	95.6	121.1	106.8	-11.8
Total	**242.2**	**325.0**	**312.1**	**-4.0**
All by origin country				
Canada	65.4	72.8	78.1	7.2
India	29.5	45.2	40.6	-10.1
Nicaragua	24.6	33.6	35.0	3.9
Mexico	28.4	56.8	29.8	-47.5
China	28.9	25.6	28.9	12.9
Peru	13.0	13.5	20.8	54.5
Thailand	8.1	11.0	13.3	21.5
Other	44.3	66.5	65.6	-1.4
Total	**242.2**	**325.0**	**312.1**	**-4.0**

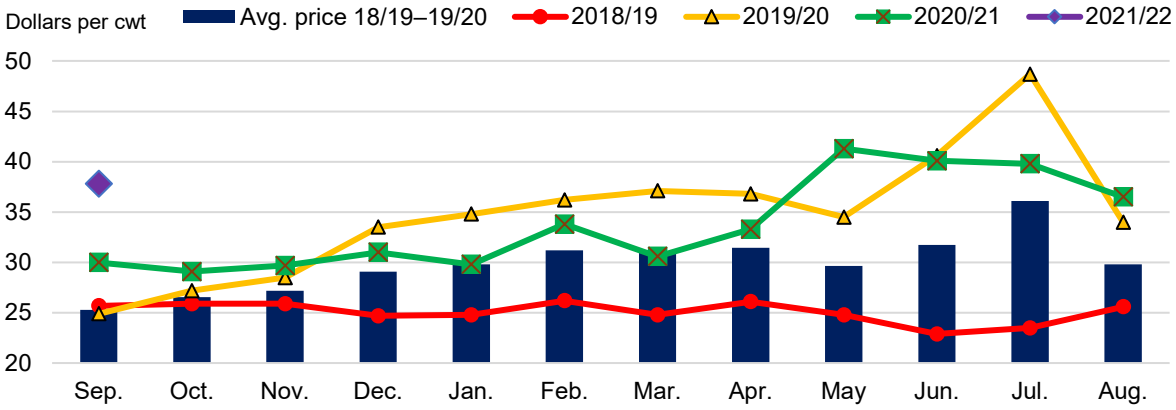
[1]Excludes garbanzo beans.
Source: U.S. Department of Commerce, Bureau of the Census.

Dry Bean Prices Up for 2021/22

Dry bean prices for the 2020/21 marketing year average price were above the previous 2-year average price levels but below the 2019/20 marketing year average price by almost 3 percent (figure 12). The September 2021 dry bean price increased by 26 percent to $37.80per hundredweight from the September 2020 marketing year price. Lower harvested acreage and high prices are likely to encourage producers to increase planted acreage for the 2022/23 marketing year. Dry bean prices for the 2021/22 crop year are expected to continue trending upward as harvested acreage and drought-reduced yields have reduced supplies.

Figure 12

Dry bean monthly prices, 2018/19 – 2021/22[1]



Note: Avg. = Average price over 2 previous crop years (2018/19 – 2019/20). Cwt = hundredweight, a unit of measure equal to 100 pounds. 1/ Excludes chickpeas.
Source: USDA, National Agricultural Statistics Service, *QuickStats* and *Agricultural Prices*.

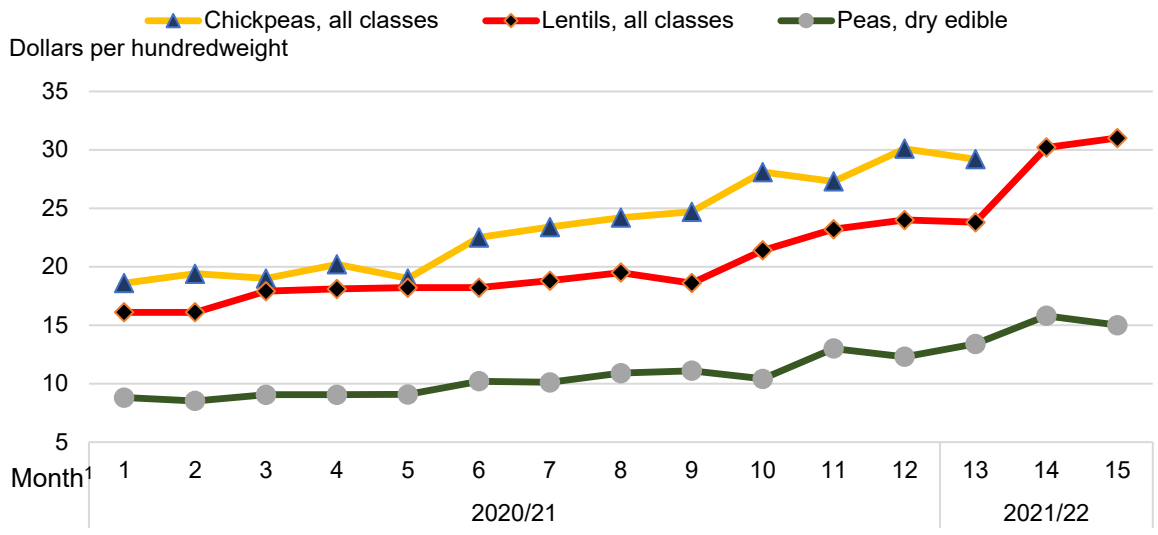
Dry Edible Peas, Lentils, and Chickpeas

Drought Decimates Dry Pea, Lentil, and Chickpea Yield

According to USDA's *Crop Production* report dry edible pea producers reduced planted acres by almost 3 percent whereas lentil and chickpea producers increased planted area from 25 to 42 percent. Regardless of varied planting patterns, the drought did not discriminate and decimated dry pea yield (down 41 percent), lentil yield (down 47 percent), large chickpea yield (down 48 percent), and small chickpea yield (down 57 percent) from 2020 (table 20).

Dry pea price increased (2 percent) in the July 2020 – June 2021 marketing year whereas a larger price increase was gained for lentils (up 15 percent). Chickpea prices also increased in the September 2020 – August 2021 marketing year as the large chickpea price increased by 30 percent and small chickpea price increased by 34 percent from the 2019/20 MY. Despite the increased prices in MY 2020/21 reported by USDA, yield and production declines ultimately devastated chickpea values of production which USDA, ERS estimated using the most recent price and production data currently available (table 20). The value of production for large chickpeas is down 81 percent and small chickpeas down 90 percent. The USDA, ERS estimated values of production for dry peas and lentils were also reduced by 27 and 29 percent, respectively, from the 2019/20 MY.

Figure 13
U.S. dry pea, lentil, and chickpea prices, 2020/21 – 2021/22



Note: Hundredweight is a unit of weight equal to 100 pounds.
1/ Month 1 for chickpeas is September 2020. Month 1 for dry peas and lentils is July 2020. Month 13 for chickpeas and month 15 for dry peas and lentils is September 2021, the last month of price data available.
Source: USDA, National Agricultural Statistics Service, *QuickStats* and *Agricultural Prices*.

The September 2021 chickpea all class price of $29.20 per hundredweight is currently 57 percent above the September 2020 price (figure 13). The September 2021 lentil price is 73 percent above the September 2020 price at $31.00 per hundredweight. The September 2021 dry pea price is 66 percent above the September 2020 price at $15.00 per hundredweight. Chickpea, lentil, and dry-pea prices for the 2021/22 marketing year are expected to continue trending upward as harvested acreage and drought-reduced yields have reduced supplies. Lower harvested acreage and high prices are likely to encourage producers to increase planted acreage for the 2022/23 marketing year.

Table 20: Dry pea, lentil, and chickpea acres, production, price, value, and yield

Item	2010	2018	2019	2020	2021	Change 2020–21
Planted			*Million acres*			*Percent*
Dry peas, all	0.76	0.86	1.10	1.00	0.97	-2.9
Lentils	0.66	0.78	0.49	0.53	0.71	34.7
Large Chickpeas	0.12	0.64	0.35	0.22	0.32	42.5
Small Chickpeas	0.03	0.23	0.11	0.05	0.06	25.6
Harvested			*Million acres*			*Percent*
Dry peas, all	0.71	0.81	1.05	0.97	0.92	-5.5
Lentils	0.63	0.72	0.43	0.51	0.67	29.8
Large Chickpeas	0.12	0.62	0.31	0.22	0.31	44.4
Small Chickpeas	0.02	0.22	0.09	0.05	0.06	19.4
Production			*Million hundredweight*			*Percent*
Dry peas, all	14.22	15.93	22.21	21.73	12.15	-44.1
Lentils	8.66	8.41	5.31	7.41	5.09	-31.3
Large Chickpeas	1.59	9.44	4.87	3.46	2.62	-24.3
Small Chickpeas	0.35	3.35	1.39	0.82	0.42	-49.1
Value[2]			*Million dollars*			*Percent*
Dry peas, all	139	188	233	210	120	-36.4
Lentils	222	218	94	116	93	-57.5
Large Chickpeas	49	327	102	62	61	-81.3
Small Chickpeas	7	85	30	12	8	-90.1
Yield			*Thousand pounds per acre*			*Percent*
Dry peas, all	2.0	2.0	2.1	2.2	1.3	-40.8
Lentils	1.4	1.2	1.3	1.4	0.8	-47.1
Large Chickpeas	1.3	1.5	1.6	1.6	0.8	-47.6
Small Chickpeas	1.4	1.5	1.5	1.7	0.7	-57.3
	2010/11	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**Change 2019/20 – 2020/21**
Price[1]			*Dollars per hundredweight*			*Percent*
Dry peas, all	9.77	11.80	10.50	9.64	9.84	2.1
Lentils	25.70	25.90	17.70	15.70	18.20	15.9
Large Chickpeas	30.50	34.60	20.90	17.80	23.30	30.9
Small Chickpeas	20.80	25.40	21.50	15.00	20.20	34.7

1/ USDA, National Agricultural Statistics Service (NASS) marketing year price averages, July–June for dry peas and lentils, September–August for chickpeas. 2/ Values are derived by USDA, Economic Research Service based on USDA, National Agricultural Statistics Service updated published price and production estimates.
Source: USDA, National Agricultural Statistics Service, *Crop Values*, *Crop Production,* and *Agricultural Prices*.

Trade: Exports of Chickpeas Down, Dry Peas and Lentils Up

U.S. export volume in 2020/21 for chickpeas, dry peas, and lentils was varied with chickpeas down by 15 percent to 290 million pounds, dry peas up by 28 percent to 982 million pounds, and lentils up by 2 percent to 671 million pounds. The decline in chickpea exports were influenced by a 25 percent reduction in chickpea exports to Pakistan and a 50 percent decline in chickpea exports to Spain. Lentil export increases (up by 100 percent) to Sudan and Canada (up by 20 percent) in 2020/21 outweighed the decline in lentil exports to Mexico (down by 18 percent) and other lentil destinations (down by 14 percent).

Table 21. U.S. dry pea, lentil, and chickpea marketing year export volume

Commodity	September–August (chickpeas) and July–June (dry peas and lentils) 2018/19	2019/20	2020/21	Change 2019/20 – 2020/21
				----- *Percent* -----
By class				
Chickpeas total	**317.6**	**342.7**	**290.0**	**-15.4**
Chickpeas, all	317.6	342.7	290.0	-15.4
Dry pea total	**562.9**	**764.8**	**982.7**	**28.5**
Austrian winter peas	3.0	1.7	1.5	-7.7
Green peas	288.4	354.0	316.0	-10.7
Split peas	175.5	253.4	234.7	-7.4
Yellow peas	28.4	109.8	305.6	178.4
Other dry peas	67.7	45.9	124.8	171.7
Lentil total	**324.8**	**656.6**	**671.8**	**2.3**
Lentils excluding seeds	324.8	656.6	671.8	2.3
Total (chickpeas, dry peas, and lentils)	**1,205.3**	**1,764.1**	**1,944.5**	**10.2**
By destination				
Chickpea total	**317.6**	**342.7**	**290.0**	**-15.4**
Pakistan	73.7	125.9	94.2	-25.2
Canada	**74.0**	**57.4**	**57.9**	1.0
Spain	59.4	60.7	29.8	-50.8
Other chickpea destinations	110.5	98.8	108.1	9.4
Dry pea total	562.9	764.8	982.7	**28.5**
China	17.5	75.3	265.9	253.1
Canada	111.6	154.4	183.4	18.8
Yemen	**43.8**	**46.3**	**75.8**	63.7
Other dry pea destinations	389.9	488.8	457.6	-6.4
Lentil total	324.8	656.6	671.8	**2.3**
Canada	60.0	196.5	236.1	20.1
Sudan	20.1	36.8	73.7	100.2
Mexico	31.3	69.9	57.1	-18.3
Other lentil destinations	**213.4**	**353.4**	**304.9**	-13.7
Total (chickpeas, dry peas, and lentils)	**1,205.3**	**1,764.1**	**1,944.5**	**10.2**

Source: U.S. Department of Commerce, Bureau of the Census data.

The increase in dry pea exports was propelled by the large increase in yellow peas (up by 178 percent) and other dry peas (up by 171 percent). Lower average export prices for yellow peas made them attractive to importers in China and Canada. Yellow pea export unit values were down for the fourth consecutive year in 2020/21 and were the lowest since 2006/07. All the other major dry pea type exports declined in 2020/21. Despite green pea volume being down by 10 percent, green peas were again the largest dry pea type exported in 2020/21 as they have been for the fifth straight year. China was the largest destination for dry pea exports in 2020/21, with export volume increasing by 253 percent to 265 million pounds.

Trade: Chickpea Imports Up, Dry Pea and Lentils Down

U.S. import volume for dry peas, lentils, and chickpeas in the 2020/21 marketing year declined 7 percent with reduced imports for dry peas (down 20 percent) and lentils (down 7 percent) outweighing a 20-percent gain in chickpea import volume. The decline in dry pea imports reflect high U.S. stocks and low prices. Chickpea imports were up due to shrinking U.S. stocks caused by the short 2020/21 crop. Most of the additional chickpea volume entered from Canada and Turkey.

Special Article

Food-Safety Practices Among Post-Harvest Handlers of Fresh Produce

Gregory Astill and D. Adeline Yeh

Even before implementation of new U.S. food safety legislation in 2015, many firms that handle fresh fruits and vegetables in the U.S. supply chain reported using food-safety practices. Specialized firms generally reported higher rates of food-safety practice use compared with diversified firms. The most used practice among all firm types is having a food-safety plan with 78 percent of nonfarm facilities having one. Among all firm types, rates of use exceeded 50 percent for about one-quarter of food-safety practices.

In 2011, the United States Congress passed the Food Safety Modernization Act (FSMA) covering the entire U.S. food supply chain. As part of FSMA, the U.S. Food and Drug Administration (FDA) implemented rules covering fresh fruits and vegetables as they are grown, harvested, and packed on farms and as they are processed after harvest in food facilities. The Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption (also known as the Produce Safety Rule) covers farms; the Current Good Manufacturing Practice, Hazard Analysis, and Risk-Based Preventive Controls for Human Food (also known as the Preventive Controls Rule) covers food facilities. Generally, the Preventive Controls Rule carries more stringent requirements than the Produce Safety Rule.

The fresh produce supply chain is diverse with many variations in activities performed and ownership structure. The FDA determines whether a firm is considered a farm and covered under the Produce Safety Rule or whether the firm is considered a facility and covered under the Preventive Controls Rule based on (1) the post-harvest fresh produce activities the firm performs, and (2) whether the firm is owned by a farm that grows fresh produce. Different post-harvest activities carry different risks of introducing microbial contamination that can lead to foodborne illness like *Salmonella* or *Listeria*. Certain post-harvest activities like packing or packaging whole pieces of fresh produce carry lower risk of introducing foodborne pathogens. Other post-harvest activities like cutting, chopping, and coring fresh produce, or further processing like canning or freezing carry higher risk of introducing foodborne pathogens. The FDA determined that any firm that performs certain higher-risk post-harvest activities is covered

under the Preventive Controls Rule, regardless of ownership structure or whether the firm also grows produce as a farm.

Firms that only perform lower-risk post-harvest activities may be covered by the Produce Safety Rule or the Preventive Controls Rule, depending on their ownership structure. Fresh produce firms may organize their post-harvest operations in many ways. For example, a firm may (1) only package the produce it grows and harvests on its own farm, (2) package produce grown and harvested on other farms in addition to its own, or (3) only package produce grown and harvested by other farms. A firm may be owned by the same person who owns the farm sourcing the produce or be independent from any growing operation. The FDA determined that when a firm performing only lower-risk post-harvest activities is majority-owned (MO) by the farm providing a majority of the produce handled, the firm is considered a “secondary activities farm” and covered by the Produce Safety Rule.

These coverage distinctions are important for firm owners and policy makers to understand, as are the implications of these distinctions for the structure of fresh produce markets. Using data from a novel survey of U.S. fresh produce post-harvest operations and the food-safety practices they employ, we report differences among firms covered by the Produce Safety Rule and the Preventive Controls Rule for different reasons. The survey was conducted by the U.S. Department of Agriculture’s (USDA) National Agricultural Statistics Service (NASS) in conjunction with USDA’s Economic Research Service (ERS) in 2015, prior to the first compliance date for the Preventive Controls Rule in September 2016.

After building a custom list frame of historically understudied U.S. post-harvest fruit, nut, and vegetable firms, NASS mailed surveys to about 2,200 operations. After telephoning non-respondents NASS received 640 usable responses for a 29 percent response rate. Among respondents, 26 percent handled only vegetable commodities, 19 percent handled only wine grapes, 18 percent handled only fruit commodities, 5 percent handled only tree nuts or peanuts, and 32 percent handled mixed, other, or unreported commodities.

Table 1 lists the percentage breakdowns of activities performed by the respondents. About half of the sampled firms grew or harvested fresh produce. Since the survey was targeted at post-harvest operations in the United States, 99 percent of respondents reported that they engaged in at least one post-harvest activity in 2015. A minority of firms reported performing higher-risk activities, like cutting (14 percent), fresh-cutting (7 percent), or processing (20 percent). Firms that reported performing only lower-risk post-harvest activities made up 68 percent of respondents.

Table 1. Pre-harvest and post-harvest activities carried out by firms in the survey

Activity	Yes	No	Not reported
Grow	43%	50%	7%
Harvest	49%	50%	1%
Pack	39%	59%	2%
Post-harvest activities	99%	1%	0%
Higher-risk post-harvest activities			
Cutting	14%	86%	0%
Fresh-cutting	7%	93%	0%
Processing	20%	80%	0%
Only lower-risk post-harvest activities	68%	32%	0%

Notes: Cutting includes cutting, coring, chopping, shredding, slicing, peeling, or trimming. Fresh-cutting includes pre-cut, packaged, and ready-to-eat bagged salads; bagged, baby-cut carrots, etc. Processing includes boiling, canning, freezing, juicing, and jams. Lower-risk activities include washing, labeling, packing, transporting, storing, and others.

Source: USDA, Economic Research Service's and USDA, National Agricultural Statistics Service's (NASS)—jointly conducted—2015 Produce Post-Harvest Microbial Food Safety Practices Survey.

Table 2 categorizes the sample into five groups based on firms' reported post-harvest activities and their ownership structure. First, both non-farm facilities (19 percent of the respondents) and farm mixed-type facilities (13 percent of the respondents) conducted higher-risk post-harvest activities in 2015 and were likely to be covered by the Preventive Controls Rule. The difference between the two is whether the firm grows the produce they handle. A non-farm facility processes fresh produce grown and harvested by other farms, whereas a farm mixed-type facility processes produce grown and harvested from its own farm.

A secondary activities farm (3 percent of the respondents), covered by the Produce Safety Rule, performs only lower-risk post-harvest activities, and is majority-owned (MO) by the farm providing the majority of the produce handled. In contrast, a secondary-activities non-farm facility (35 percent of the respondents), which also performs only lower-risk post-harvest activities, is covered by the Preventive Controls Rule since the facility is not owned by a farm supplying the majority of produce it handles. Finally, 30 percent of respondents only conduct lower-risk post-harvest activities on the farm and would likely be categorized as primary production farms and covered by the Produce Safety Rule.

Table 2. Firm types and rule coverage based on post-harvest activities and ownership structure

Firm type	Post-harvest activities	Grow	Ownership structure	Rule coverage	Respondents
Non-farm facility	Higher-risk	No		PCR	19%
Farm mixed-type facility	Higher-risk	Yes		PCR	13%
Secondary activities non-farm facility	Lower-risk	No	Not MO	PCR	35%
Secondary activities farm	Lower-risk	No	MO	PSR	3%
Primary production farm	Lower-risk	Yes		PSR	30%

Notes: PCR stands for Preventive Controls Rule. PSR stands for Produce Safety Rule. MO stands for majority-owned by the farm that provides a majority of the produce handled.

Source: USDA, Economic Research Service's and USDA, National Agricultural Statistics Service's (NASS)—jointly conducted—2015 Produce Post-harvest Microbial Food Safety Practices Survey.

Table 3 presents the proportion of firms within each type that reported answering 'yes' to various foods safety practices. The three most common food-safety practices among all firm types were a food-safety plan, a written food-safety plan, and a traceability plan. As specialized firms, nonfarm facilities, primary production farms, and secondary activities non-farm facilities reported the highest, second-highest, and third-highest proportion of food-safety activity for most practices, respectively. As diversified firms, farm mixed-type facilities and secondary activities farms alternated between reporting the lowest and second-lowest proportion of food-safety activity for most activities. The highest proportion of firms to report a practice was the 78 percent of nonfarm facilities that have a food-safety plan. The smallest proportion was the 4 percent of farm mixed-type facilities that reported hiring an outside food-safety consultant. The largest difference between firm types was in the proportion of nonfarm facilities that had a recall plan (66 percent) and the proportion of secondary farms that had a recall plan (38 percent). The smallest difference was between the proportion of nonfarm facilities that had a full-time food-safety supervisor (30 percent) and the proportion of farm mixed-type facilities that did (23 percent).

Table 3. Proportion of firms within each type responding 'yes' to each food-safety practice

Firm Type	Non-farm facility	Farm mixed-type facility	Secondary activities non-farm facility	Secondary activities farm	Primary production farm
FDA Rule Coverage	PCR	PCR	PCR	PSR	PSR
Food-Safety Practice					
Food-safety plan	78%	67%	66%	67%	71%
Written food-safety plan	65%	48%	57%	48%	59%
Third-party food-safety audit	46%	33%	40%	33%	42%
Traceability plan	71%	55%	57%	48%	68%
Electronic records	49%	40%	41%	33%	46%
Recall plan	66%	41%	50%	38%	51%
Recall exercise	45%	18%	36%	29%	35%
Recall insurance	36%	23%	30%	24%	29%
Microbial testing of food contact surfaces	42%	29%	30%	24%	32%
Microbial testing of product	45%	30%	25%	19%	30%
Full-time food-safety supervisor	30%	23%	27%	29%	28%
Hired outside food-safety consultant	8%	4%	12%	10%	12%

Note: PCR stands for Preventive Controls Rule. PSR stands for Produce Safety Rule.

Source: USDA, Economic Research Service's and USDA, National Agricultural Statistics Service's (NASS)—jointly conducted—2015 Produce Post-harvest Microbial Food Safety Practices Survey.

Special Article

Countercyclical Pricing Observed in the Collard Greens Market

By Gregory Astill and Shiona Deliozar

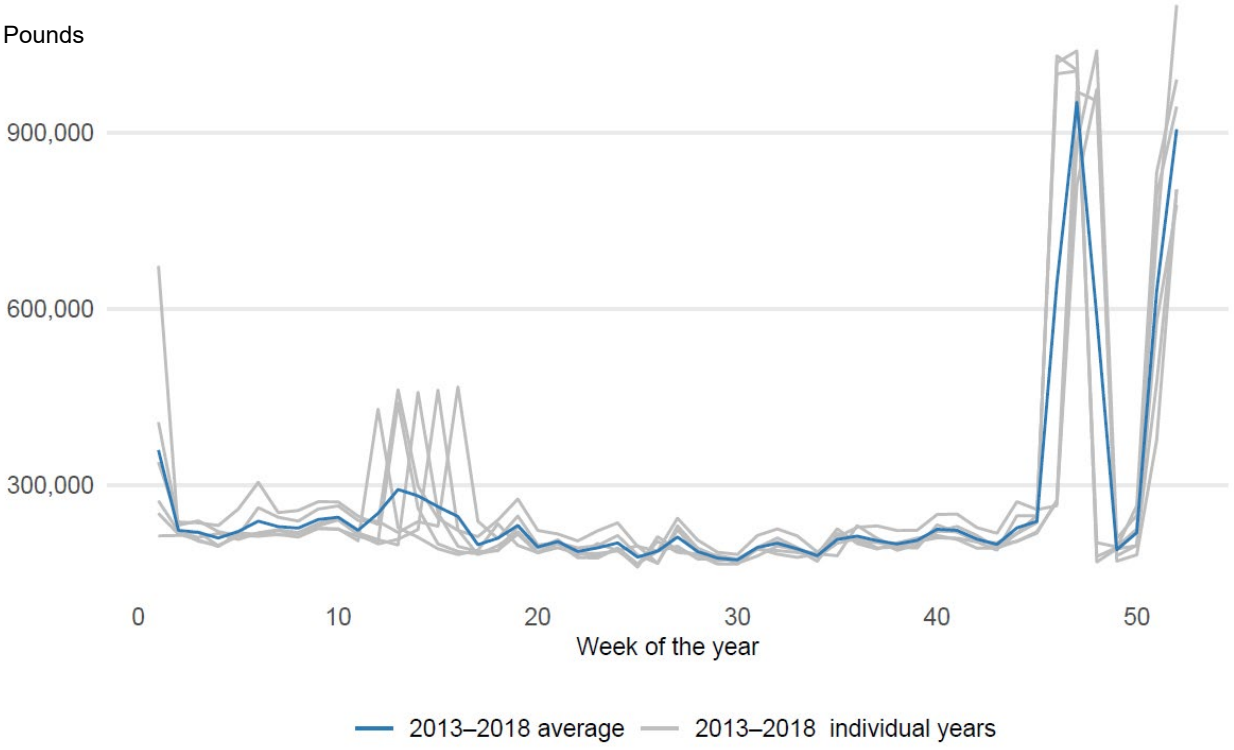
The market phenomenon known as “countercyclical pricing”—where retail prices decrease in times of increased consumer demand—has been observed by economists in goods like tuna during Lent or canned soup during winter. This analysis provides another example of countercyclical pricing in a different commodity—fresh collard greens.

Collard greens are a staple of Southern cuisine and associated with good luck when eaten on the first day of the New Year. From 2011 to 2020, annual per capita availability of collard greens increased by 43 percent from 0.88 pounds to 1.26 pounds (Lucier and Davis, 2021). The Information Resources, Incorporated (IRI) InfoScan retail scanner data contains billions of weekly retail food transactions from large portions of the United States including transactions for collard greens (Muth et al., 2016).1 Using IRI data from 2013 to 2018, we observe annual dramatic and consistent surges in collard green purchases during the weeks of Thanksgiving, Christmas, and New Year’s Day accompanied by a smaller spike around Easter (figure 1).

[1] Disclaimer: The analysis, findings, and conclusions expressed in this report should not be attributed to IRI.

Figure 1

Seasonal collard greens purchases by weight surge during weeks of Easter, Thanksgiving, Christmas, and New Year's Day 2013–2018



Source: Information Resources, Incorporated Retail Scanner Data, 2013–2018.

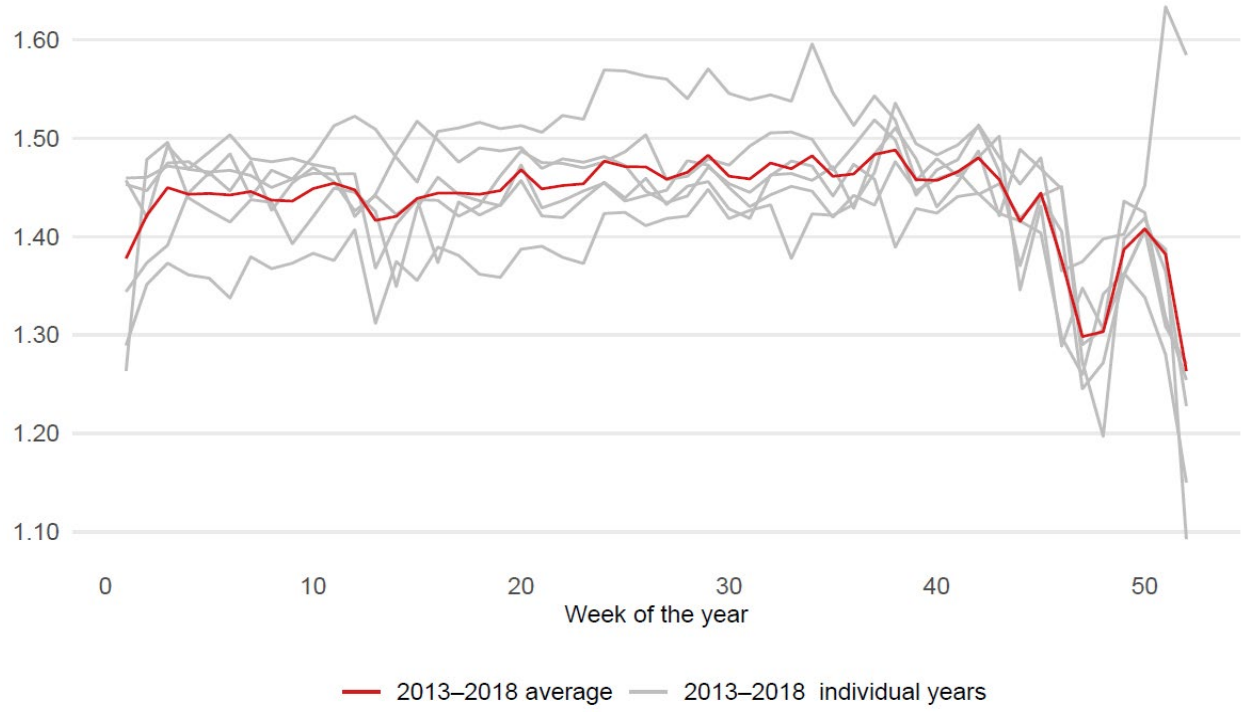
Note: Week in which holidays fall each year.

	2013	2014	2015	2016	2017	2018
Easter	13	16	14	12	15	13
Thanksgiving	47	47	47	46	46	46
Christmas	51	51	51	51	51	51
New Year's Day	52	52	52	52	52	52

Purchases increased between 57 and 73 percent for the Easter holiday week compared to the weekly average for the year. Purchases increased between 252 and 304 percent for the Thanksgiving holiday week, and between 202 and 278 percent for the New Year's Day holiday week. In many commodity markets during periods of high demand, prices increase, but during weeks of high demand for collard greens, prices typically drop (figure 2). This counterintuitive movement in demand and prices underlies the meaning of the term "countercyclical pricing." In most years, the largest collard greens price drops occur during these four holiday weeks. Decreases range between 1 and 7 percent for the Easter holiday week compared to the weekly average for the year; between 6 and 16 percent for the Thanksgiving holiday week; and between an increase of 8 percent (in 2018) and a decrease of 22 percent (in 2013) for the New Year's Day holiday week.

Figure 2

Seasonal collard greens, U.S. dollars per pound drop during weeks of Easter, Thanksgiving, Christmas, and New Year's Day 2013–2018



Source: Information Resources, Incorporated Retail Scanner Data, 2013–2018.

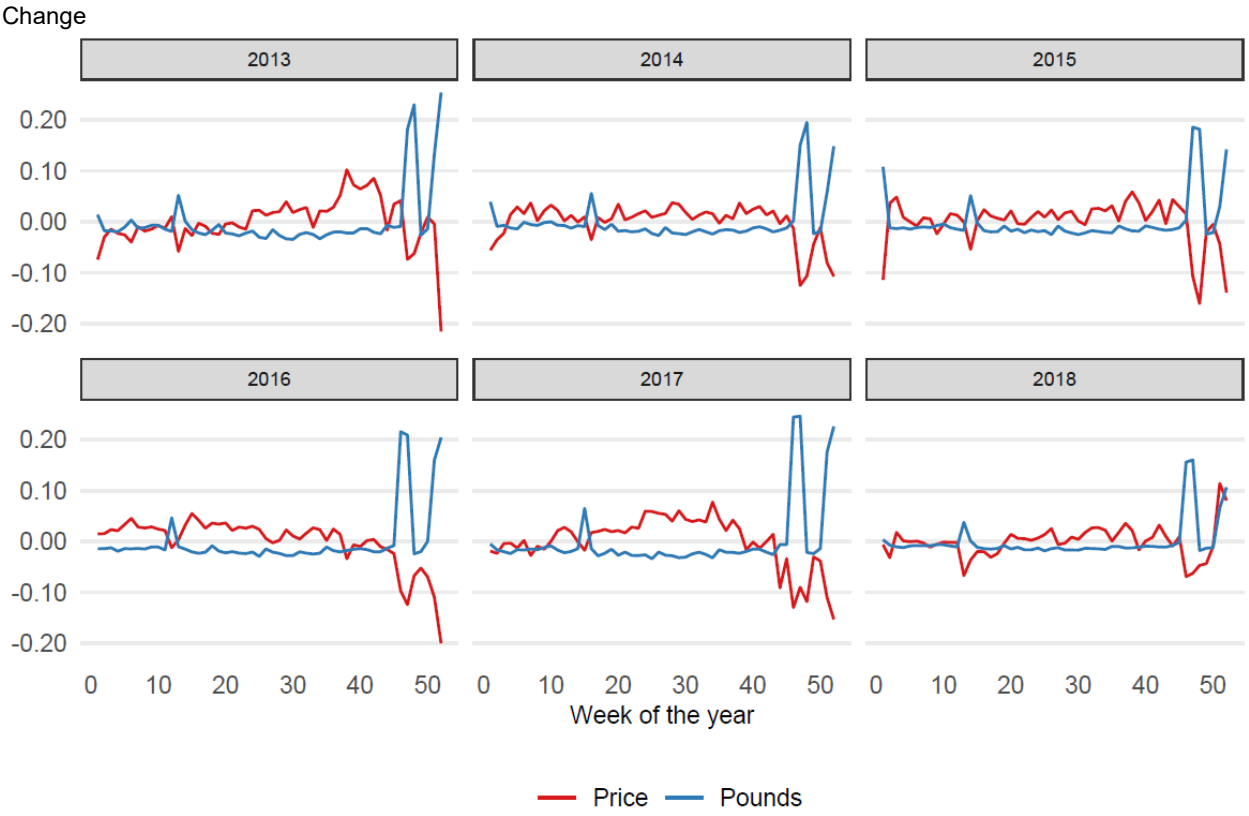
Note: Week in which holidays fall each year.

	2013	2014	2015	2016	2017	2018
Easter	13	16	14	12	15	13
Thanksgiving	47	47	47	46	46	46
Christmas	51	51	51	51	51	51
New Year's Day	52	52	52	52	52	52

After calculating percent changes in purchases and prices compared to the weekly average during the year, we scale the percent change in purchases to make its range visually comparable to that of prices (figure 3). During Easter, Thanksgiving, and New Year's Day holiday weeks, weekly purchases by weight move above the weekly average for the year. Often weekly prices move below the average for the year. For example, in 2014 during the week of the Easter holiday collard greens purchases increased by 76 percent compared to the weekly average for the year, and prices decreased by 4 percent. During the week of Thanksgiving collard greens purchases increased by 266 percent, and prices decreased by 11 percent; and during the week of New Year's Day purchases increased by 202 percent, and prices decreased by 11 percent.

Figure 3

Percent change from weekly average price drops when scaled percent change from weekly average purchases by weight surges



Source: Information Resources, Incorporated Retail Scanner Data, 2013–2018.

Note: Week in which holidays fall each year.

	2013	2014	2015	2016	2017	2018
Easter	13	16	14	12	15	13
Thanksgiving	47	47	47	46	46	46
Christmas	51	51	51	51	51	51
New Year's Day	52	52	52	52	52	52

References

Lucier. G., and W. V. Davis. 2021. Vegetables and Pulses Machine Readable Data, VGS-366, U.S. Department of Agriculture, Economic Research Service.

Muth, M.K., M. Sweitzer, D. Brown, K. Capogrossi, S. Karns, D. Levin, A. Okrent, P. Siegel, and C. Zhen. 2016. Understanding IRI Household Based and Store-Based Scanner Data, TB-1942, U.S. Department of Agriculture, Economic Research Service.

Suggested Citation

Davis, Wilma V., and Gary Lucier. 2021. *Vegetable and Pulses Outlook: November 2021*, VGS-367, U.S. Department of Agriculture, Economic Research Service, November 19, 2021.