Commodity Spotlight

USDA photo

Sweet Potatoes: Getting to the Root of Demand

For many Americans, "sweet potato" invokes thoughts of holiday cheer. While sweet potatoes certainly boast a strong holiday connection (Thanksgiving, Christmas/Hanukkah, and Easter), this root crop also remains a popular vegetable year-round in the American South and in Asia, Africa, and Brazil. In the southern U.S., sweet potatoes are also referred to as yams, although few true yams are grown in the U.S.

Two basic types of sweet potatoes are grown in the U.S—moist-flesh types (which feature sweet, orange, soft, moist flesh when cooked) and dry-flesh types (which have dry, starchy, firm flesh when cooked). The moist types, also known as dessert-types or soft-fleshed varieties, account for most of the output in the U.S. and are also the types frequently—and imprecisely—referred to as "yams."

The U.S. is the world's 10th- largest producer of sweet potatoes. China produces 85 percent of the world's crop, followed by Indonesia (2 percent), Vietnam (2 percent), and Uganda (1 percent). In China, an increasing share of the crop has been shifting into animal feed (largely for hogs) and industrial markets (largely for starch) over the past 30 years.

Over the 1999-2001 period, U.S. sweet potato growers produced an average of 13.5 million hundredweight (cwt) from 90,500 harvested acres, and farm cash receipts averaged $214 million. According to the 1997 Census of Agriculture, sweet potatoes are grown on 1,770 farms—down 34 percent from 1992 and 44 percent from 1987. About 25 percent of area is irrigated, with about a third of this acreage in California, which is entirely irrigated. Since 1992, Louisiana growers have doubled their irrigated area to 30 percent. Only 9 percent of North Carolina's crop is irrigated.

The long-term downward spiral in production that began after the Depression has been reversed. Since reaching a trough in 1988, U.S. sweet potato production has trended higher, rising 15 percent between 1989-91 and 1999-2001. Production in 2001 was the third highest since 1965. U.S. acreage (1.1 million) and production (48 million cwt) peaked in 1932.

North Carolina Is Top U.S. Producer

Except for California, the U.S. sweet potato industry is concentrated largely in the Southeast. North Carolina, Louisiana, and California are the top three producing states and accounted for about 79 percent of the U.S. crop during 1999-2001. Mississippi and Alabama round out the top five states. Production in Mississippi, since bottoming out in 1989, has trended upward, increasing eightfold to 2.2 million cwt by 2001—the highest since 1946.

During 1999-2001, North Carolina accounted for about 37 percent of the U.S. sweet potato crop and 29 percent of the farms growing sweet potatoes. With production trending upward the past 8 to 10 years, the state has remained the leading producer since 1970. When USDA crop estimates began in 1868, Georgia was the leading producer, with North Carolina second. The majority (about three-quarters) of North Carolina's output is sold in the fresh market, with the remainder sold for processing or used for seed stock. North Carolina markets fresh sweet potatoes year-round throughout the country, with substantial volume moving to New York, Baltimore, and Chicago. Sweet potatoes contribute about 20 percent of the state's vegetable cash receipts.

Louisiana, the second leading sweet potato producer, accounted for about 24 percent of the U.S. crop during 1999-2001. Louisiana was the leading sweet potato state from 1943 to 1969. A majority of its output is used for processing (largely canning). However, the fresh-market share has likely been rising as much of the growth in the state's output over the past 8-10 years appears to have gone into the fresh market. Fresh markets for Louisiana include Chicago and Detroit. At $46 million, sweet potatoes account for 57 percent of the state's vegetable cash receipts.

California, with one-fourth the acreage of North Carolina and the highest yields in the industry, is the third leading producer of sweet potatoes, accounting for 18 percent of the U.S. crop during 1999-2001. As in North Carolina and Louisiana, production has been trending slowly upward over the past 8-10 years. More than 75 percent of the crop is likely sold in the fresh market annually. Major fresh markets for California growers include Los Angeles, San Francisco, and Seattle. At $63 million, sweet potatoes account for just 1 percent of the state's vegetable cash receipts.

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Sweet Potatoes—What They Are, & Are Not

Sweet potatoes are not yams. The yam is a starchy tropical root crop of Asian or African origin, unrelated to the sweet potato family. Nor are sweet potatoes (*Ipomoea batatas*) related to white (Irish) potatoes.

The word "yam" was originally derived from the African word "nyami." But what is marketed in the U.S. as a "yam" is really a type of sweet potato. True yams bear no relationship to the sweet potato. The roots, which tend to be big, rough, and starchy, are grown in tropical areas largely outside the U.S. In some areas, the term "yam" has been used in marketing to differentiate moist-type sweet potato varieties from the less common dry types. When used to refer to sweet potatoes, the word "yam" must be accompanied on labels with the words "sweet potatoes" under USDA requirements.

The outer skin of a sweet potato tends to be smooth and can vary in color from coppery orange to pale yellow with several variations, including purple. The inner flesh can range from white to yellow to red with deep orange flesh most common today. The so-called dry varieties of sweet potatoes tend to be dry, light in color, and firm in texture when cooked.

Native to tropical America (likely from South America), sweet potatoes are part of the morning glory (*Convolvulaceae*) family. Columbus observed them during his expeditions to the West Indies, while DeSoto later found sweet potatoes growing in what is now Louisiana. Native Americans were reportedly growing sweet potatoes in present-day Georgia when English settlers arrived.

The Incas of South America and Mayans of Central America reportedly grew several varieties, one for food and others for coloring materials to use in paints. As a tropical plant, sweet potatoes do not thrive in cool weather and therefore did not readily become popular in Europe, even in the warmer regions of the Mediterranean. Sweet potato seed stock is thought to have been spread by Spanish and Portuguese explorers to various regions of the world.

Sweet potatoes for commercial use are grown largely from transplants—plantlets (slips or sprouts) produced from the roots of the previous crop. These are most commonly produced from certified root stock, but can be produced from farm-held seed stock.

In some countries, the leaves and shoots of the sweet potato plant are also used for food, as they are a nutritious leafy green, high in iron and vitamins A and C. In many parts of Africa, sweet potatoes are a staple food crop. In Uganda and Kenya, growers chip and sun-dry a portion of the crop for later use.

Exports Sprouting

The U.S. is self-sufficient in production of sweet potatoes and is a net exporter. Export sales totaled $14 million in 2001, while imports were valued at $4 million. Only about 1 percent of sweet potato consumption is satisfied through imports. Few imports enter the continental U.S., with most volume (97 percent in 2001) moving directly from the Dominican Republic into Puerto Rico.

Until recently, U.S. trade in sweet potatoes has not been a significant factor in the market. Since the early 1990s, U.S. sweet potato exports have been on the rise. Between 1989-91 and 1999-2001, fresh/frozen sweet potato export volume nearly tripled to 43 million pounds. More than 3 percent of supply is now exported—up from 1 percent a decade ago. Canada remains the major market for U.S. sweet potatoes, but substantial gains have been realized in the United Kingdom (UK).

While volume shipped to Canada has increased, its share of U.S. exports has declined. In 2000, Canada accounted for 91 percent of U.S. export volume. This slipped to 82 percent in 2001 and stood at 71 percent through the first 6 months of 2002. Meanwhile, the UK's share has risen from 6 percent in 2000 to 24 percent during the first half of 2002.

The Seasonal Factor

Although some sweet potatoes are sent to market directly after harvest, most sweet potatoes are marketed from storage after curing. Curing involves keeping a freshly harvested crop in a heated, humid room (typically 7-10 days but sometimes longer) to allow the skin to heal and set. Curing also allows the sugar content of the sweet potato to rise (as starches are converted to sugars), making cured roots sweeter than those sold "green."

Some varieties can be stored for as long as a year in controlled-atmosphere storage. Because of their soft flesh, shrinkage and loss while in storage (as much as 2 percent a month) tends to be greater than for white potatoes. Sweet potatoes are typically washed, graded, and sometimes waxed before being shipped to market.

The period surrounding major holiday celebrations continues to dominate sweet potato sales. Sweet potato shipments are strongest during the fourth quarter (October-December), moving about 39 percent of fresh sweet potatoes. The combination of holiday demand and large harvest-period volume (harvest activity peaks in October) keeps shipments strong during this quarter.

Although market demand during the holidays remains robust, its share has weakened over the past decade with the industry working to expand year-round markets (especially in areas other than the South). In fact, shipment volume during the "off-season" (May-August) increased to 22 percent of annual market shipments during the early 2000s. This is up from 19 percent in the 1990s and 18 percent during the 1980s, reflecting improved storage quality and suggesting an expansion in demand outside traditional market windows.

Seasonal price movements are those that regularly occur within a year, and are more pronounced when a crop is harvested and then marketed from storage. Sweet potato prices generally reach their seasonal highs during July and August as storage supplies run low and the new season begins. Prices reach seasonal lows in October with the peak of harvest. After adjusting for inflation, shipping point (grower) prices for sweet potatoes have remained constant over the past decade. Retail prices are not reported for sweet potatoes.

Season-average sweet potato shipping-point prices gained an average of 33 cents per cwt each year between 1970 and 2001. The price of sweet potatoes averaged $16.10 per cwt (f.o.b. shipping point) during the 1999-2001 seasons, up 6 percent from the previous 3 years (1996-98), and 23 percent above the 1989-91 average. Through September 2002, the index of producer prices for sweet potatoes averaged 8 percent below a year earlier.

Per Capita Use Steady

On average, more than three-quarters of the annual U.S. sweet potato crop is sold as human food. Nonfood uses include animal feed (5-9 percent), seed (7-9 percent), farm household use (about 2 percent), and shrinkage and loss. In the U.S., about a quarter of the sweet potatoes sold for food are processed into canned products (including baby food). About 4 percent of sweet potatoes sold for food are processed into frozen products. A small amount (2 to 3 percent) is chipped or dehydrated. This leaves about two-thirds of sweet potato sales for the fresh market.

During 1999-2001, U.S. sweet potato consumption averaged an estimated 1.2 billion pounds. On a per capita basis, this works out to 4.1 pounds—unchanged from 1989-91 but down from 4.7 pounds in 1979-81. During 2001, fresh-market use was estimated to be 2.9 pounds per person, with the remaining 1.4 pounds sold as processed products (largely for canning). Total sweet potato consumption is similar to mushrooms but exceeds green peas, cauliflower, and asparagus.

Per capita use of sweet potatoes trended downward between the 1920 peak of 29.5 pounds and the early 1930s before surging briefly during the Depression. In the mid-1930s, per capita use embarked on a long downward trend, which lasted through the early 1980s. Despite twice falling to a record-low 3.7 pounds in 1993 and 1999 (due to weather-reduced output), sweet potato use has largely stabilized since the mid-1980s—hovering around 4.1 pounds. The recent stability in consumption likely reflects:

- industry efforts to expand fresh sweet potato use beyond the holiday niche;
- increased consumer recognition of the nutritional qualities of sweet potatoes;
- introduction of sweet potato chips and fries; and
- better quality due to improved storage and handling techniques.

While consumption has undoubtedly received a boost from these factors, several opposing forces appear to be offsetting the industry's attempts to raise use. These include:

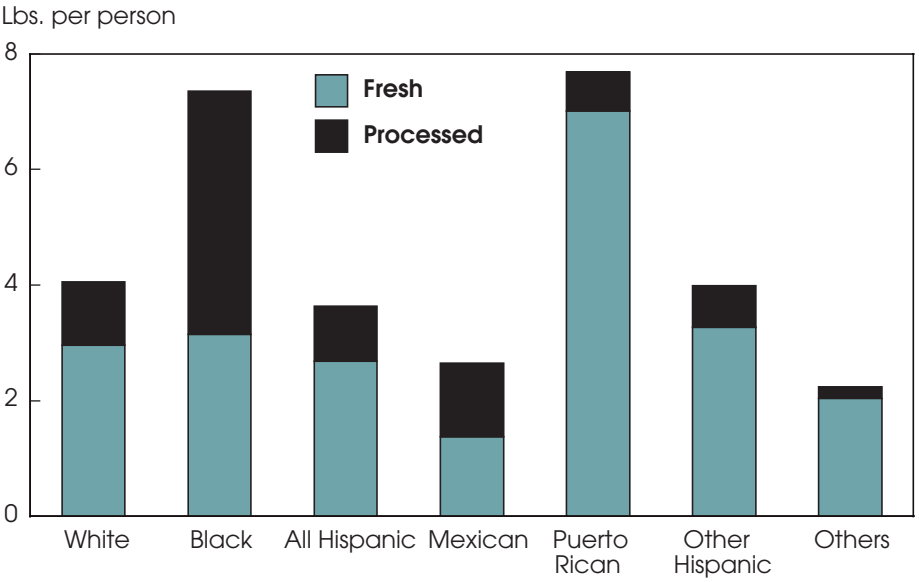
- increased away-from-home eating;
- attraction to ethnic and spicy foods; and
- greater diversity in the nation's population.

For most vegetables, the latter three market forces have been instrumental in driving consumption higher over the past two decades. However, the sweet potato market appears to have more in common with the cabbage market than, for example, the onion or broccoli markets. Cabbage and sweet potatoes are similar in that both have suffered long-term declines in consumption after peaking earlier in the last century. Both are hardy staples with some storability, much like white potatoes.

But white potato growers have been able to offset declining interest in fresh potatoes with rising sales of frozen and dehydrated products (*AO* October 2002). These products are also featured in the rapidly expanding food-service arena and are widely accepted by most ethnic groups.

Sweet potatoes have had minimal success in the food-service industry, where much of the growth in food consumption has taken place since the 1960s. Although the industry has developed and marketed sweet potato fries, chips, and other new products, widespread adoption has remained elusive. However, the addition of sweet potato side dishes by various national restaurant chains appears to

Per Capita Use of Sweet Potatoes Highest Among Puerto Ricans and Blacks



Utilization for 2001 derived by ERS from *1994-96 Continuing Survey of Food Intake by Individuals.* Per capita use on a fresh-equivalent basis.

Economic Research Service, USDA

promise future growth in this market segment.

While vegetables like garlic and onions have benefited from a broadening of the national diet to include various ethnic foods, sweet potatoes have been largely left behind. Burgeoning Hispanic and Asian populations over the past 20 years have brought renewed demand for peppers, onions, tomatoes, and dry beans, but the sweet potato industry has realized few benefits since these two ethnic groups are not major consumers of the moist dessert type of sweet potatoes that dominate the U.S. market. Many of these growing ethnic markets prefer the dry-flesh varieties common to their homelands.

Sweet potatoes have been called a "nutritional powerhouse"—frequently ranked among the most nutritious of all vegetables. Because of their orange/yellow color, they are very high in beta carotene (higher than carrots), which is converted by the body to vitamin A. They also contain the carotenoids lutein and zeaxanthin. Sweet potatoes also provide a substantial amount of vitamin C, are a good source of vitamin B6 and dietary fiber, and provide small amounts of several other vitamins and minerals, such as potassium, manganese, and folic acid.

Like white potatoes, sweet potatoes are multipurpose vegetables. Fresh-market sweet potatoes can be baked, microwaved, broiled, grilled, and boiled, but can also be used in a wide variety of recipes such as green salads, casseroles, pasta sauces, plate garnishes, dipping vegetables (fresh-cut sticks), relish trays, sautéed vegetable medleys, soups, stews, and stir fry. They also appear in processed forms as frozen (sliced, diced, french fried, pattied, twice-baked), dried/dehydrated (flakes, flour, chips), and canned (cut/sliced, candied, mashed, baby food, pie fillings). Sweet potatoes are also used in manufacturing other prepared foods such as bread products, custards, cookies, pies, and cakes. In some countries, alcohol is distilled from sweet potatoes.

Although there are no price or income support programs for sweet potatoes, USDA has regularly purchased processed sweet potato products for use in school lunch and other feeding programs. During fiscal years 1997-2001, USDA purchased about 8 million pounds annually (product weight) valued at about $4 million (95 percent were canned). This year, based on purchase offers released in August and September, USDA plans to purchase up to 30 million pounds (product weight) of fresh, canned, and frozen sweet potato products for donation to child nutrition and other domestic food assistance programs.

Who Eats Sweet Potatoes?

On any given day, 1 to 2 percent of Americans consume at least one food containing sweet potatoes, according to data derived from USDA's 1994-96 *Continuing Survey of Food Intakes by Individuals*. This trails such popular foods as french fries (13 percent), catsup (16 percent), and garlic (18 percent). Fresh-market sweet potatoes are used on any given day by nearly 1 percent of consumers, while processed products (frozen, canned, and dried) appear on the plates of less than 1 percent of U.S. consumers daily. The low incidence of daily consumption likely reflects the seasonal nature of sweet potato demand and the relatively low adoption rates by the food-service and industrial foods industries.

More than many other mainstream vegetables, sweet potatoes are consumed at home (89 percent). This partly reflects the seasonal nature of the market with the incidence of home cooking featuring traditional holiday favorites, as well as the lack of convenient products that can be used in restaurant and institutional settings.

In the away-from-home market, fast food accounts for just 2 percent of sweet potato consumption, with standard full-service restaurants accounting for another 5 percent. Other, largely institutional outlets account for another 4 percent of consumption. Few ethnic restaurants (e.g., Italian, Chinese, Lebanese, Korean, and Indian) use sweet potatoes in their cuisine. Since the USDA survey in 1996, fresh-market use of sweet potatoes has likely increased in full-service restaurants from the 3 percent indicated at that time, with recent introductions of sweet potato sides on menus.

Sweet potatoes are most popular in the South, where the majority are produced. As defined by the Census, the South is the largest region, accounting for 35 percent of the nation's population, 42 percent of fresh-market sweet potato consumption, and 54 percent of processed consumption. Per capita use of all sweet potatoes in the South was estimated to be 5.7 pounds in 2001, followed by the Midwest (4.3 pounds), and the Northeast (3.9 pounds). Those in the West eat the fewest sweet potatoes (2.6 pounds), with processed products amounting to 0.8 pounds.

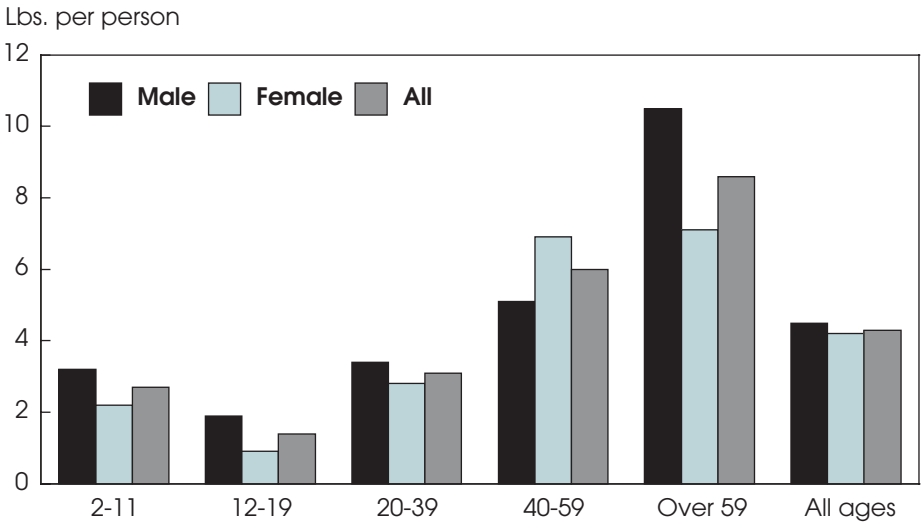
Consumption figures from the USDA food-intake survey revealed that Black consumers exhibit a greater preference for sweet potatoes than other consumers—an estimated 7.4 pounds per person in 2001 (4.2 pounds processed and 3.2 pounds fresh). Black consumers, who make up 13 percent of the U.S. population, accounted for 21 percent of sweet potato consumption—about 70 percent greater than the U.S. average. This may largely explain the higher consumption in the South, since Census data also indicate that more than 50 percent of Blacks reside there.

Whites (non-Hispanic) consumed slightly more fresh sweet potatoes (3 pounds) than the national average (2.9 pounds), but consumed proportionately fewer processed sweet potatoes (1.1 pounds) than the average (1.4 pounds). Among Hispanics, Puerto Ricans were found to consume more than 7 pounds per person, with part of their supply imported from the Dominican Republic.

The Carver Connection

George Washington Carver, well known for his work with peanuts, also figured prominently in the sweet potato industry of the early 20th century. According to the George Washington Carver Foundation at Tuskegee University, Carver counseled growers in the South to rotate crops to help condition and enrich depleted soils. To this end, he helped increase production of sweet potatoes by creating new markets for growers through development of a myriad of products derived from sweet potatoes. Notable products included textile dyes, stains, shoe polish, starch, inks, wood fillers, hog feed, alcohol, sugar, candy, vinegar, and various dehydrated products.

Sweet Potato Consumption Rises with Age



ERS fresh utilization for 2001 derived by ERS from1994-96 *Continuing Survey of Food Intake by Individuals.*

Economic Research Service, USDA

Middle-income consumers appear to favor sweet potatoes most. Households with incomes between 131 percent and 350 percent above the poverty level (the cutoff point for food stamp eligibility is 130 percent of the poverty level) represent 42 percent of the U.S. population, but consume 47 percent of all sweet potatoes. When looking at the fresh market, both middle- and upper-income consumers reported eating proportionately more than their population shares. For processed products, middle- and lower-income consumers reported consuming more than their respective population shares, while the upper-income group consumed substantially less.

In the aggregate, sweet potato consumption is relatively similar among males and females with males (4.5 pounds) eating slightly more per capita than females (4.2 pounds). In general, consumption (largely of processed products) starts strong with children under 12 years of age, likely reflecting use of baby food and sweet candied products. Use then declines sharply as children reach their teens, with teenage girls eating less than 1 pound per capita. Consumption then begins to pick up as people reach adulthood, with per capita consumption more than doubling for females aged 20-39 (2.8 pounds) and 40-59 (6.9 pounds). Males 60 years of age and older account for 7 percent of the population but consume 16 percent of all sweet potatoes—the equivalent of 10.5 pounds per person in 2001 and the highest among all age groups. Females in this age group were the second strongest consumers, with the equivalent of 7.1 pounds per person. This suggests that a taste for sweet potatoes may be acquired with maturity.

Based on production and use data, it appears that U.S. sweet potato demand has stabilized during the past decade and may be poised for growth. Substantial promotional efforts made by national and state industry associations likely played a role in stemming the long-term declining trends in per capita use. However, it seems clear that further concentrated effort will be required to coax the highly nutritious sweet potato out of the holiday shadow and into everyday life. **AO**

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A new report from USDA's Economic Research Service

Once they were relegated to a niche market and sold in a limited number of retail outlets. Today, organic foods are turning up in conventional supermarkets, farmers' markets, and club stores, as well as in natural product retail outlets. A new ERS report summarizes growth patterns in the U.S. organic sector in recent years and traces the market channels for major commodity groups. Also addressed: research, regulatory, and other USDA programs on organic agriculture.

On the Economic Research Service website
www.ers.usda.gov/publications/aib777/