Commodity Spotlight

Cabbage Heads Higher

It was the French who inspired the English word “cabbage,” believed to be derived from *caboche*, a slang term meaning “head." Head cabbage has been an important player in U.S. produce circles for many years. Thomas Jefferson grew 22 varieties of cabbage at his Monticello estate, according to the 1987 volume *Blue Corn and Square Tomatoes*.

The French also used “*mon petit chou*” ("my little cabbage") as a common term of endearment. In recent years, cabbage has recently become a little more endearing to Americans, gaining 7 percent in per capita use between 1990-92 and 2000-02. This is a turnaround from a steady decline between the 1920s and the 1990s, when Americans looked elsewhere for more variety and convenience in their food. In the past decade, fresh-cut products, new recipes, and a growing body of nutritional research have lent new support to cabbage demand. While total cabbage consumption rose to 10.3 pounds per person in the early 2000s, it is still 57 percent below the 1920s, when cabbage use averaged 22 pounds.

Cabbage has four distinct end uses:

- food manufacturing including deli-type coleslaw and frozen eggrolls;
- the traditional fresh market;
- the sauerkraut industry; and
- the fresh-cut salad industry which uses cabbage in salad mixes, shredded bagged cabbage, and as the main ingredient in fresh-cut bagged coleslaw.

According to estimates by USDA’s Economic Research, processed deli-type coleslaw (40 to 45 percent of use) and fresh head cabbage (around 35 percent) account for the majority of cabbage disposition. Other major uses include sauerkraut (12 percent) and various fresh-cut products (5-10 percent). Retail sales of fresh-cut bagged coleslaw averaged about $70 million in 2000 and 2001—4 percent of the $2-billion fresh-cut salad retail industry. A small amount of cabbage is dehydrated (dried, flakes, or powder) for use as a flavoring agent in soups and as an ingredient in other dehydrated foods.

Fresh-market cabbage consumption averaged a fairly steady 8.5 pounds in the 1970s, 1980s, and 1990s. However, the 1990s saw increased use of red cabbage in fresh-cut salad mixes and popularity of fresh-cut bagged coleslaw, helping to spur consumption. Sauerkraut use appears to have stabilized at about 1.3 pounds per person over the past decade. Demand for sauerkraut peaked shortly after World War II and trended steadily lower before leveling off in the early 1990s.

The U.S. accounts for 4 percent of world cabbage production, ranking sixth behind China (38 percent of world output), India, Russia, South Korea, and Japan. U.S. cabbage production is largely centered in the East and upper Midwest but spreads across the 50 states, with 82,000 acres and 4,289 farms shipping to the fresh and processing markets. U.S. head cabbage had an average farm value of $319 million annually during 1999-2001, with the fresh market accounting for 97 percent of crop value.

Cabbage Volume Peaks In March

The volume of fresh-market cabbage shipments peaks in March, spurred by the traditional St. Patrick's Day fare of corned beef and cabbage. About 14 percent of the domestic crop is marketed in March, compared with 10 percent for February and December (the next-highest months). The majority of these winter shipments come from Texas, Florida, and New York. Volume is lowest in July at 4 percent of annual shipments.

Depending on the variety and growing conditions, a mature head of cabbage weighs from 1 to 5 pounds with some even larger, especially when destined for processing. Most fresh-market cabbage is hand harvested to minimize damage and maximize yield, while most cabbage destined for processing is machine harvested to keep costs down. Because cabbage plants do not mature uniformly, fresh-market fields are frequently harvested several times to maximize yield.

Shippers in states such as New York, Pennsylvania, Michigan, and Wisconsin routinely place late-season cabbage in cold storage for later marketing—even until the following summer in the case of New York, the industry leader. If stored under proper conditions (controlled atmosphere facilities) late-season cabbage can keep for as long as 6 months.

Annual cabbage shipping-point prices trended higher during the 1990s, after a decade of stagnation in the 1980s. Between 1991 and 2001, nominal f.o.b. shipping point prices nearly doubled. Higher average fresh cabbage shipping-point prices in the face of rising produc-

The Cabbage Patch

Cabbage belongs to the *Cruciferae* (mustard) family—which includes Brussels sprouts, broccoli, cauliflower, and kale. Cabbage is of the genus *Brassica*, species *oleracea*, and variety *capitata*. This shallow-rooted, cool-season crop (grows best when temperatures are 50-75 degrees F.) is cultivated for its large leafy head and is thought to have originated in Western Europe. Before being thought of as a food, cabbage was valued for medicinal purposes in treating headaches, gout, and diarrhea. Cabbage juice was reportedly used as an antitoxin for poisonous mushrooms.

The pungent smell for which cooked cabbage is noted is caused by sulfur compounds that are released when the vegetable is heated. Cabbage is best cooked in an uncovered steel pot or pan since aluminum pots and pans tend to enhance the sulfurous chemical reaction.

Although this article focuses largely on traditional head cabbage, there are several different types of cabbage. Several vegetables also have cabbage in their names but may not even resemble what we commonly consider cabbage. Some of the various kinds of cabbages and pretenders include:

Green head cabbage is the traditional common type that still dominates the market. It sports light green leaves in a large compact head consisting of many thick, overlapping, smooth, waxy leaves. The outer “wrapper” leaves on fresh cabbage fit loosely and are usually discarded by the consumer. On cabbage sold from cold storage, the wrapper leaves are trimmed off before retailing and the head color is usually much paler (prolonged cold storage whitens cabbage). There are three main types of green head cabbage—domestic, Danish, and pointed.

- **Domestic types** feature loose, rounded, or partly flattened heads which tend to be medium in size (2-3 pounds), relatively sweet, and preferred for coleslaw.

- **Danish types** feature smooth, round, hard and compact, almost white heads. These late varieties are both marketed in the late fall and moved into cold storage for later sale. They are suitable for sauerkraut and are also said to be good for cooking.

- **Pointed** varieties, grown chiefly in the Southwest, feature smooth leaves and small, cone-shaped heads.

Red cabbage (*Rubra* subgroup) resembles green head cabbage except that its leaves have a purplish-red color that adds interest to salad mixes.

Savoy-type cabbage varieties (*Sabauda* subgroup) feature crinkled leaves in a loosely compact, yellow-green, oval-shaped head. A good source of beta carotene, savoy tends to be tender and mild and is well suited for both cooking and salads.

Chinese cabbage (*brassica pekinensis*) is also known as *napa, hakusai, pe-tsai, won bok*, and *Peking cabbage*. Chinese cabbage is sweeter and milder than head cabbage and has oblong, thin, crisp, crinkly, cream-colored inner leaves with light green ends.

Bok choy (*brassica chinensis*) also called *Chinese white cabbage* and *white mustard cabbage*, has long, mild, white stalks topped with green leaves.

The pretenders (cabbage by name only. . .)

Cabbage palm yields a delicacy known as the “Heart of Palm”—the meat of the cabbage palm tree which is actually the Sabal Palm—Florida's state tree.

Ornamental cabbages also known as flowering kale. Some varieties are marketed as decorative garnishes for salad bars, but most are grown for fall and winter landscaping plants.

Cabbage turnip is another name for Kohlrabi, which resembles a turnip with leaves and whose flavor is similar to turnip.

Skunk cabbage *(Symplocarpus foetidus)*, unrelated to the cabbage family, is found in wet areas of the Midwest and Northeast. It is an early spring wildflower with an unpleasant odor.

tion likely results from strong demand. In this case, much of the additional demand is likely coming from fresh processing firms that use shredded cabbage in salad mixes.

The portion of the cabbage retail value accounted for by the shipping-point price has been slowly but steadily declining. During 1995-99, growers and shippers received about 27 percent of the retail value-up from 24 percent during 1990-94 and 25 percent during 1985-89 but down from 32 percent during 1980-84. In 2000, when final cabbage retail prices for the year were reported, shippers had received 29 percent of the retail value.

New York Heads the Pack

According to the 1997 Census of Agriculture, head cabbage is produced on 4,289 farms in all 50 states—down 22 percent from 1992. Although the number of farms producing cabbage has declined, output has trended higher and average farm size has risen, powered by demand for fresh-market cabbage. Over 1999-2001, total

Commodity Spotlight

annual cabbage production averaged 19 percent above 1979-81 levels. During that interval, cabbage used for sauerkraut (called “liberty cabbage” during World War I) declined 19 percent, but production of fresh-market cabbage rose 27 percent.

There is little overlap between the fresh cabbage and sauerkraut markets, as sauerkraut makers prefer cabbage varieties with white interiors and high solids content (less water). In any given year, 98 percent of cabbage used for sauerkraut is grown under contract with processors, with open-market purchases limited to a few hundred acres. According to the 1997 Census of Manufacturers, seven firms manufacturing sauerkraut had sales over $100,000—the same number as in 1992. These manufacturers shipped the equivalent of nearly 10 million gallons (in cans, jars, and fresh-market polybags), valued at $20.5 million, to distributors and retailers in 1997.

New York produces about a fourth of the nation's head cabbage, with 79 percent destined for the fresh market. New York tops the fresh market with 22 percent of national output and produces 39 percent of the nation's sauerkraut—second only to Wisconsin. According to the Census of Agriculture, 389 New York farms were growing cabbage in 1997—28 percent fewer than in 1992. Fresh-market production increased 61 percent over the past decade (1989-91 to 1999-2001). Output of cabbage for sauerkraut in New York has also increased, rising 23 percent in the past decade. Consolidation among U.S. processors has led to diminishing output in Michigan, Ohio, and Washington.

New York's fresh-market crop accounts for 95 percent of the State's $77 million in farm cash receipts for cabbage (1999-2001). New York's fresh-market cabbage is shipped year-round with planting beginning in early April. Harvest begins in August and continues into early December, with market shipments strongest from September through November and seasonally low in June. A portion of the crop is placed in cold storage and is marketed into the following summer.

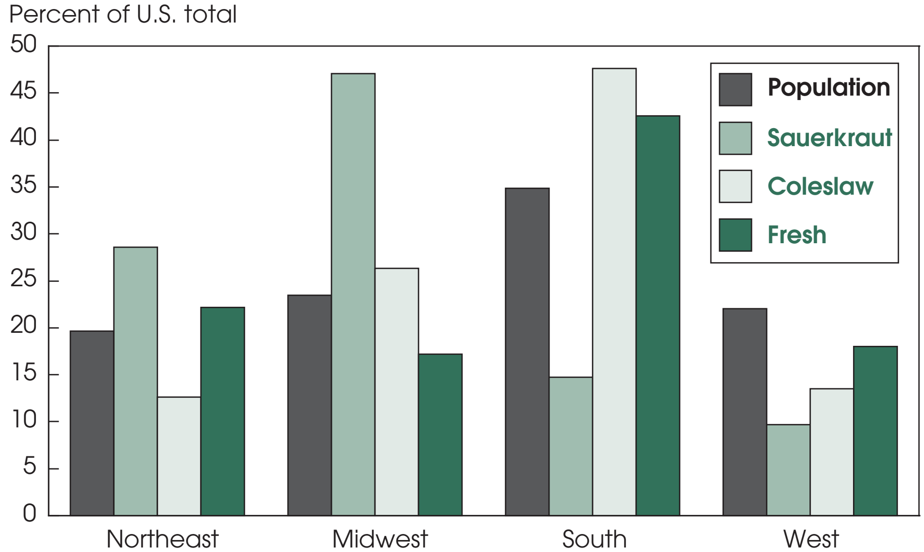
California is the second-largest producer of head cabbage (virtually all for the fresh market), with 16 percent of national output and 18 percent of the fresh-market crop. Acreage and production have trended higher since bottoming out in the mid-1970s. With a farm value of $72 million, cabbage production during 1999-2001 averaged 44 percent above 1989-91 and 125 percent above 1979-81. According to the Census of Agriculture, cabbage was produced commercially on 252 California farms in 1997, up 14 percent from 1992 and 50 percent from 1982. Much of the recent acreage gains have originated in the Salinas Valley of Monterey County—sometimes referred to as the salad bowl of America and headquarters for many of the major fresh-cut salad firms in the U.S. California harvests and ships fresh-market cabbage year-round, with volume generally peaking in January and February and again in September and October.

Texas is the third-largest domestic source of head cabbage, accounting for 13 percent of the U.S. crop and 15 percent of the fresh-market crop. Despite periods of extreme irrigation water shortages in key production areas, fresh-market cabbage production has increased 33 percent since 1989-91, but output remains 7 percent below the 1979-81 peak. With a farm value of $53 million, head cabbage was harvested by 152 farms in 1997—down 14 percent from 1992. Texas harvests and ships fresh-market cabbage year-round with volume peaking in January and February and again in September and October.

With 10 percent of U.S. production, Wisconsin is the fourth-leading source of head cabbage and is the top producer of cabbage for sauerkraut (nearly half of national output). Two-thirds of the state's head cabbage (valued at $4 million) goes into manufacturing sauerkraut. Although the Badger State's cabbage production during 1999-2001 was little changed from the past decade, it stood 25 percent higher than in 1979-81. Fresh-market production is up 44 percent since 1979-81, while cabbage for sauerkraut is up 16 percent. According to the 1997 Census of Agriculture, head cabbage is produced on 142 Wisconsin farms—down 34 percent from 1992. Fresh-market cabbage is shipped July-November, with volume generally peaking in October. Although Wisconsin only accounts for 4 percent of U.S. fresh-market production, the state provides one-third of national supply in October.

With 145 farms (1997 Census of Agriculture), Georgia supplies more than 8 percent of U.S. head cabbage (10 percent of

Proportionately More Sauerkraut Is Consumed in Midwest and Northeast Than Other Regions



Source: Derived by ERS from *1994-96 Continuing Survey of Food Intake by Individuals*, Agricultural Research Service, USDA.

Economic Research Service, USDA

the fresh-market crop)—placing it fifth. Production in Georgia was valued at $22 million during 1999-2001—eight times greater than 1979-81. This reflects both a general increase in national vegetable production over the past two decades, plus the relocation and/or expansion of farm operations from other states.

Trading Heads

Foreign trade plays a relatively minor role in the U.S. fresh and processed cabbage industries. In terms of value, the U.S. has historically been a net exporter of cabbage as steady year-round supply from an efficient domestic industry keeps prices low and limits opportunities for imports. In 2001, exports of fresh-market cabbage totaled $18 million while imports were valued at $14 million. For sauerkraut, exports totaled $2.7 million while imports totaled $1.1 million in 2001.

Since at least 1960, the U.S. has exported a steady 3-4 percent of available fresh-market cabbage supply. While export share has changed little, fresh import share of consumption has increased from less than 1 percent in the 1960s and 1970s, to 2 percent in the 1980s, 3 percent in the 1990s, and nearly 4 percent thus far in the 21st century. Canada takes 89 percent of U.S. fresh exports, while fresh imports arrive mostly from Canada (55 percent) and Mexico (44 percent). Fresh imports peak in December but are also strong out of Canada during the summer and fall. For sauerkraut, imports have averaged under 2 percent of consumption over time, with Germany accounting for over half the volume. About 3 percent of U.S. sauerkraut supply is exported annually—most shipments going to Canada.

Cabbage Is Nutrient-Rich

Cabbage, a cruciferous vegetable, is rich in nutrients. It is a good source of vitamin C, contains some vitamin A, and has a fair amount of thiamin, riboflavin, potassium, and soluble and insoluble fiber. Fresh-market cabbage is low in calories and sodium, and free of fat and cholesterol. A 100-gram serving of fresh green cabbage (about a cup and a half of shredded cabbage) contains 24 calories and over three-fourths of the recommended daily allowance (RDA) for vitamin C. A 100-gram serving (just under one-half cup) of undrained sauerkraut contains 19 calories, has no fat, provides fiber, and has 25 percent of the RDA for vitamin C. According to researchers at the Duke Comprehensive Cancer Center, cruciferous vegetables like cabbage may be powerful anti-cancer agents. Cabbage reportedly contains 11 of the 15 identified vegetable-related compounds found to deter cancer.

In addition to various fresh uses (salads, slaws, garnishes), cabbage can be prepared by boiling, steaming, sautéing, baking, braising, or stir-frying. Cabbage is frequently used in soups, stews, eggrolls, casseroles, sweet and sour dishes, and meat dishes, including the traditional corned beef and cabbage. Shredded cabbage can replace lettuce in tacos. At retail, fresh cabbage is traditionally sold from bulk displays and in a variety of fresh-cut products sold in polybags.

Americans consumed 3 billion pounds of cabbage (fresh and processed) in 2001. About 88 percent of cabbage consumption is in fresh forms, with the remainder largely in sauerkraut. According to the USDA 1994-96 *Continuing Survey of Food Intakes by Individuals*, 71 percent of head cabbage is consumed at home. Most sauerkraut is consumed at home, while cole-slaw accounts for the largest share of cabbage consumed away from home. Reflecting a wide range of food-service uses, about 56 percent of coleslaw is consumed away from home, with fast food (26 percent of all coleslaw) the single largest source. Per capita use of fresh-market cabbage was 9.1 pounds in 2000 and 2001 and coleslaw was the primary source of fresh cabbage for many consumers.

Before recently stabilizing at 1.3 pounds per person, sauerkraut consumption had trended lower during the 1980s from an average of 2.2 pounds in the 1960s and 1970s. This may have reflected occasional negative publicity regarding red meat consumption (particularly smoked meats) and a general trend away from salty foods. The recent stabilization in per capita use may reflect the inclusion of sauerkraut in a wider array of recipes as consumers

Sour Cabbage

Although a type of wine-pickled sauerkraut was reportedly made in China over 2,000 years ago, the Germans are credited with being the first to ferment cabbage using salt near the end of the 16th century. The word “sauerkraut” means “sour cabbage” in German. Since it kept well and contained vitamin C, sauerkraut sailed the open seas and helped prevent scurvy. Sauerkraut was introduced to America by German immigrants in Pennsylvania.

Sauerkraut is made by shredding special varieties of cabbage, adding salt, and curing for several weeks in large wooden or concrete vats. Since it is a salt-pickled product, consumers concerned about sodium intake can rinse sauerkraut to reduce the sodium and also provide a milder flavor. According to the Pickle Packers International, there are several variations of sauerkraut, including;

- Bavarian kraut—includes caraway seeds and added sugar;
- Winekraut—fermented in white wine;
- Sauerkraut salad—a ready-to-eat, somewhat sweet and mild mixture of cabbage, onions, red peppers, vinegar, and seasonings.

According to the industry, over 1 billion servings of sauerkraut are consumed each year, with one-fourth of all households buying sauerkraut. Sauerkraut is featured at various Oktoberfest festivals (the first was in Bavaria in the early 1800s) around the world. Among the more popular uses for sauerkraut is the Reuben sandwich. This is a combination of corned beef, Swiss cheese, sauerkraut, and Russian dressing on rye bread and was invented by deli owner Reuben Kulakofsky in the kitchen of Omaha's Blackstone Hotel about 60 years ago. Even the juice remaining in a container of sauerkraut can provide added value as it makes an effective and tasty meat tenderizer. To top off your meal, sauerkraut can even contribute to dessert—among the many innovative recipes is one for chocolate sauerkraut cake.

Commodity Spotlight

search for more variety in foods. Despite the close association of sauerkraut with deli sandwiches like the Rueben and its popularity as a condiment on hot dogs, the USDA consumer diet survey indicated that sauerkraut is largely enjoyed at home (79 percent is consumed at home). The survey indicated that just 6 percent of sauerkraut came from fast-food places, and 8 percent each from other restaurants and "miscellaneous" places (e.g., ball parks, arenas, and street vendors).

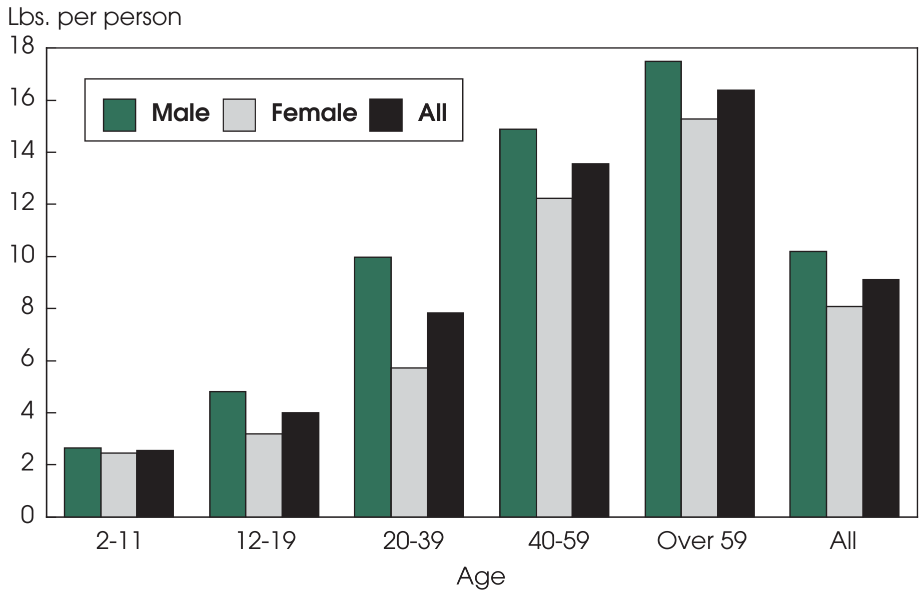
Who Eats Cabbage?

Regional breakdowns for total head cabbage consumption indicate that consumers in the South (a 16-state region defined by the Census Bureau) eat proportionately more cabbage than all other regions. This may reflect preferences along racial lines as 53 percent of non-Hispanic blacks reside in the South and blacks are the only major racial group (aside from Asians) to consume proportionately more cabbage. Whites and Hispanics each consumed less cabbage than their respective proportions of the population. As for sauerkraut, the survey indicated that three-fourths of sauerkraut was consumed in the Midwest and East, with consumers in the South and West reporting light consumption.

Whites and Hispanics consumed proportionately less fresh whole cabbage, while blacks and Asians ate a larger share. Non-Hispanic blacks, accounting for close to 13 percent of the population, consumed 33 percent of fresh whole cabbage. Whites dominated the market for coleslaw, consuming 85 percent, while other identified racial/ethnic groups consumed proportionately less than their population shares. Similarly, whites consumed 91 percent of all sauerkraut, while Hispanics and Asians consumed very little.

Sauerkraut and coleslaw appear to be favored most by consumers with the greatest financial means. Survey households identified as upper income (3.5 times the poverty level) represented 39 percent of the U.S. population but consumed 50 percent of the coleslaw and 43 percent of sauerkraut. For whole fresh cabbage, the 19 percent of consumers identified as lower income households consumed 20 percent of cabbage, while those in the upper income group consumed 36 percent. For all cabbage, middle-income households accounted for the greatest share of use (43 percent) with the lower income group consuming proportionally less.

Fresh Cabbage Consumption Rises with Age of Consumer*



*Fresh utilization for 2001 derived by ERS from 1994-96 *Continuing Survey of Food Intake by Individuals*, Agricultural Research Service, USDA.

Economic Research Service, USDA

Men consume about one-fourth more cabbage (fresh and processed) per capita than women. This may largely be explained by men's higher caloric intake, different preferences, and perhaps greater consumption of fast foods. In proportion to their population shares, both men and women over the age of 40 are strong consumers of cabbage. With the exception of coleslaw, men aged 20-39 (16 percent of the population) favor cabbage, particularly sauerkraut, accounting for 30 percent of the total. Curiously, the survey indicated that women between the ages of 20 and 39 tend to avoid cabbage of all types.

Relative to other age groups, people under 20 are very light cabbage consumers. This age group accounts for nearly 30 percent of the population, yet consumes just 10 percent of all cabbage. This may partly reflect a natural maturation of tastes and preferences, which seems plausible given strong cabbage consumption by men aged 20-39. These people were raised in the 1960s and 1970s when a wider array of foods was available, compared with the largely "old world" vegetable choices of those who grew up before 1960.

The U.S. cabbage market is a relatively mature, domestically oriented market. Demand for cabbage and cabbage products appears to have stabilized within the past decade after an extended period of contraction. The decline was likely arrested by the introduction of fresh-cut products containing cabbage, plus industry efforts to expand and encourage consumption. The success of the cabbage and sauerkraut industries may lie in expanding the range of product uses and also in the discovery and communication of product benefits. As medical and nutritional research continues to unlock the secrets to the potential health benefits of cruciferous vegetables like cabbage, consumer reaction to any new findings may ultimately hold the key to future industry growth. AO

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