



Tomatoes: A Success Story

Tomatoes—many with inspired names like Bingo, Jack Pot, and Casino Royale—supplied U.S. growers with nearly \$1.7 billion in farm-gate revenue last year. Last year's tomato receipts were higher than for any other fruit or vegetable except potatoes, and topped receipts for rice, peanuts, barley, and a number of other grain crops.

The U.S. tomato growing industry has been increasing output for several decades, primarily by increasing yields, and is currently the world's largest tomato producer. Acreage for processing tomatoes, which accounted for 85 percent of total tomato output last year, is set to rise 13 percent this year. And production could nearly reach the 10.9-million-ton record set in 1991. While the 1994 spring crop of fresh tomatoes was down about 4 percent from last year, summer acreage is expected higher than in 1993.

Tomatoes are the most widely consumed vegetable in the U.S. after potatoes. Americans consumed the fresh-weight equivalent of 92 pounds of tomatoes last year—over 76 pounds in processed

products. From juice in the 1920's to pizza sauce in the 1960's, chili sauce in the 1970's, and salsa in the 1990's, new tomato products have become food classics nearly every decade.

Fresh tomato use—16 pounds per person last year—is up about 33 percent from the early 1970's. Most of this gain occurred during the 1980's as a result of rising health consciousness, the increased popularity of salad bars and fast-food restaurant meals, and a growing interest in ethnic foods.

Use of processed tomato products has been trending upward during the past decade. Much of the gain is likely the result of continued expansion in food-service demand, especially for pizza, tacos, and other Italian and Mexican foods—pizza consumption, for example, has tripled since the late 1970's. The largest processed use is for sauces (35 percent), followed by paste (18 percent), canned tomatoes (17 percent), and ketchup and juice (each about 15 percent).

The U.S. accounts for about 16 percent of the world's total tomato output. U.S. processed tomato exports have been strong for several years, but rising prices will likely lead to expansion in world production this year and increased competitive pressure in U.S. export markets.

Two Sectors Stake Out Different Territory

While U.S. acreage and consumption are higher for processed tomatoes, grower revenue is higher for fresh—\$1.1 billion versus \$0.6 billion last year. The two subsectors have virtually no overlap either geographically or in production and marketing.

U.S. growers harvested 440,150 acres of tomatoes last year, 70 percent for processing. Although tomatoes are grown in every state on nearly 14,000 farms, production is concentrated in only two states. Florida produced nearly half of the fresh-market tomatoes last year, and California produced 93 percent of the processing crop and 29 percent of fresh.

All of California's tomato crop and 97 percent of Florida's are produced under irrigation.

A number of factors, aside from geographic location, set the fresh and processing industries apart.

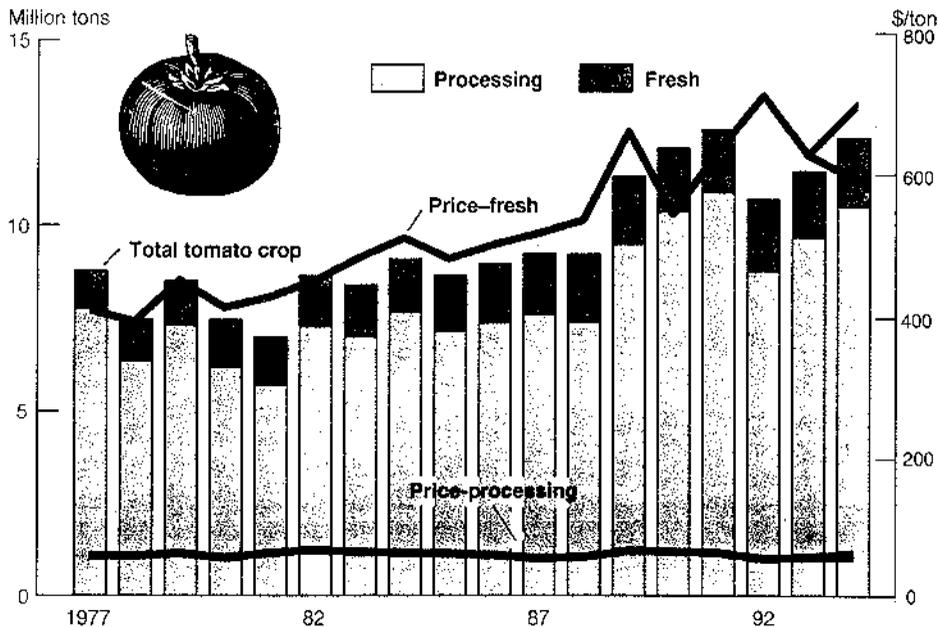
- Tomato varieties are bred specifically to serve the requirements of either the fresh or the processing market. Processing varieties contain the higher percentage of soluble solids (averaging 5 to 9 percent) for efficient conversion into products such as tomato paste and sauces.
- In contrast to tomato production for the fresh market, with few exceptions tomatoes grown for processing are produced under contract between growers and processing firms.
- Most processing tomatoes are machine harvested, while virtually all fresh-market tomatoes are hand harvested. Mechanical harvesting and bulk handling systems replaced hand harvest of processing tomatoes in California in the 1960's, after development of cultivars with firm flesh, thick walls, and uniform ripening.
- Prices for fresh-market tomatoes are generally higher and more variable because of their perishability. Once processed, tomatoes can be stored and marketed in a more controllable fashion.

Even considered separately, California leads every nation in the world in the production of processing tomatoes, with tomato concentrates (especially paste, sauces, and catsup) accounting for a majority of the end products. Harvest of the California processing tomato crop is at its peak during August and September, with more than half the crop produced in Fresno and Yolo Counties. California's processing tomato acreage has more than doubled since 1960, while fresh-market acreage has remained flat.

Fresh-market tomatoes are produced across many California counties in every season but winter, with San Diego (spring and fall seasons) and Fresno

Commodity Spotlight

Fresh and Processing Tomato Crops Are Up from Last Year



Season-average grower prices. 1994 forecast range. 1994 production is midpoint of forecast range.

(summer season) Counties accounting for about a third of the crop. In Florida, the largest producer of fresh-market tomatoes, the season stretches from October to June, with production peaking during November through January and during April and May. Primary production areas change with the season, moving from southern Florida—particularly Dade County—in the winter months, into areas farther north—especially Collier and Manatee Counties—as the weather warms.

Other important tomato producing states include Ohio, with 3 percent of the processing tomato crop and 2 percent of fresh-market tomatoes, and Virginia and South Carolina, each with about 3 percent of the fresh crop.

Imports Provide a Fifth Of Fresh Supplies

Fresh tomatoes are available throughout the year, with shipment sources varying by season. During the winter, the bulk of Florida's crop is shipped into markets in the eastern half of the U.S., while Mexico's crop is shipped largely to western

states. Commercial fresh-market tomato shipments peak during the spring, when Florida's volume is at maximum and California and other southeastern states begin to ship tomatoes. Market volume and prices are lowest during August and September, due to availability of local supplies and home-garden tomatoes.

Imports accounted for 21 percent of the U.S. fresh tomato supply last year with about 8 percent exported. The U.S. was a net importer with a deficit in 1993 of \$203 million. Fresh tomato imports arrive mostly from Mexico (96 percent of imports in 1993), with some coming also from the Netherlands (2 percent) and Canada (1 percent). Fresh tomato exports go primarily to Canada (88 percent of exports in 1993), but exports to Mexico (11 percent) have been steadily increasing, particularly during June to September.

Although shipments fluctuate each year due to weather conditions, the percentage imported has changed little, with a slight downward trend over the past 20 years, and is not expected to change much in the next few years. The North American Free Trade Agreement (NAFTA) stipu-

lates that tariffs on fresh-market tomato trade between Mexico and the U.S. will be totally phased out within 10 years (5 years for the less sensitive July 15–November 14 season). With a long tariff phase-out period and safeguard quotas during the winter and spring seasons, NAFTA's impact on fresh tomato trade will likely be very gradual.

Florida and Mexico historically compete for the U.S. winter and early spring market. Shipments from Mexico (from Sinaloa) peak in the same months when Florida (Dade County) is the dominant U.S. production area. Together with heavy urban growth pressures and accompanying high land values, this may explain the declining tomato acreage in Dade County over the past decade.

Since 1991, the U.S. has been a net exporter of processed tomato products, with exports exceeding imports by \$134 million last year. Imports accounted for about 2 percent of U.S. processing tomato supply in 1993, and exports totaled 5 percent of supply.

The U.S. exported \$177 million in processed tomato products in 1993. Paste and sauces each account for one-third of exports. The major export markets for U.S. processed tomato products are Canada (57 percent), Japan (10 percent), and Mexico (5 percent).

Tomato paste accounted for 47 percent of the \$43 million in tomato products the U.S. imported in 1993 (mostly bulk paste brought in from Mexico during the spring for remanufacture in the U.S.). Under NAFTA, tariffs for tomato paste, puree, sauces, and whole products will be phased out over 10 years. U.S. ketchup and tomato juice tariffs were eliminated immediately this past January.

Tailoring the Commercial Varieties

Despite the myriad of fresh tomato varieties, there are two basic "kinds" of fresh tomatoes in the marketing chain, distinguished by their stage of maturity—mature green and vine ripened. Mature

Green Light for Longer Lasting Tomatoes

The U.S. Food and Drug Administration recently gave Calgene Fresh, Inc. the go-ahead to begin marketing their genetically engineered tomato, called the Flavr Savr. The company claims the new tomato will be able to be harvested closer to full ripeness (gaining more flavor) and yet maintain enough firmness to allow marketing through current channels.

The Flavr Savr was developed to inhibit the enzyme that causes a ripe tomato to soften. This is expected to increase shelf life 7-10 days over conventional vine-ripened tomatoes. The implications of such a product include less cullage and loss throughout the marketing chain.

Calgene's Flavr Savr tomato is the first longer life tomato to be developed using biotechnology, but several longer life tomatoes—including Pioneer Hi-Bred International's Super Life variety—have been developed using more conventional breeding techniques. And rather than selling improved tomatoes to consumers like Calgene, Pioneer is planning to market Super Life seeds to growers.

Calgene expects to market its tomato year-round, with production in both the U.S. and Mexico. On the retail side, it is unknown how consumers will react to the product. One question is the reaction to a known genetically engineered product. Another is whether consumers will be willing to pay a premium for the Flavr Savr. This likely hinges on whether the taste of the tomato is significantly improved from other tomatoes in the marketplace.

green tomatoes are picked while green and then ripened (de-greened) for 1-3 days in humid storage rooms in an atmosphere containing an organic, nontoxic gas called ethylene (tomatoes and many other fruits produce ethylene gas naturally during the ripening process).

Because ungasged mature green tomatoes have a storage life of up to 3-4 weeks after harvest (depending on maturity), shippers and repackers can more easily control the marketed volume of these tomatoes. Once these tomatoes are fully ripe and on the retail shelf, there is no way to tell at which stage they were harvested.

Vine-ripened tomatoes, on the other hand, are harvested after they start to change from green to pink (sometimes called breakers). Vine-ripened tomatoes tend to be price discounted at the ship-

ping point because they have a shorter shelf life. The shelf life of pink (breaker) tomatoes is between 1 and 2 weeks after being packed or repacked.

The marketing sequence for fresh-market tomatoes starts with hand picking tomatoes in the field. Tomatoes are then sent to a packing plant where they are washed, culled, sorted by color, and graded, sized, and packed according to size and degree of ripeness. To assure more uniform ripeness, tomatoes may also be de-greened (ripened using ethylene gas). Many growers may use the same packer, while some large growers run their own packing facilities.

Tomatoes are then transported to repacking facilities, terminal markets, supermarket warehouses, or are exported. Tomatoes may be further sorted, de-greened, and repacked for final distribution to retail stores, food-service outlets, various institutions (including the military), or export. During the summer, some tomatoes may be gleaned at the grower/packer level for sale at roadside stands and farmers' markets, or grown specifically for direct marketing to the consumer.

Commercial varieties have been developed and tailored to meet the requirements of packing, shipping, and retailing in the fresh market or for use in the processing market. Firm flesh, thick walls, uniform ripening, and higher solids content for processing tomatoes, are among the characteristics that have already been bred into various commercial tomato cultivars.

Classical breeding technologies have in the past added varietal improvements, but plant biotechnologies may be the method of choice in the future. Current biotechnology research applications for tomatoes include insect and viral resistance, delayed ripening (for improved harvesting, transportation, and shelf life), increased starch and solids content, and improved flavor.

[Gary Lucier (202) 219-0888] **AO**