



Seasonal Prices and Supply-Side Adjustments in the California Strawberry Industry

by Frank M. Han, Colin A. Carter and Rachael E. Goodhue

The strawberry market, like other markets for perishable agricultural commodities, is characterized by boom-bust price cycles resulting from seasonal variability in production and uncertain weather conditions. For individual producers, there are large payoffs to participating in the peak points of the annual cycle, which typically occur during the months of December, January, and February. However, agronomic constraints on the timing of production, and technical constraints on transportation and storage, limit producers' ability to market during high price periods. For the industry as a whole, the aggregate results of individuals' efforts to respond to seasonally-based price fluctuations can be self-defeating. For example, with innovations such as the breeding of heartier varieties, or improving storage and transport, changes in industry price patterns often follow. Producers' attempts to benefit

from predictable components of price seasonality may dampen such cycles. This article examines some current production trends in the national strawberry industry and identifies some important economic issues associated with seasonal price patterns.

California has dominated strawberry production in the United States over the last three decades. Concurrently, California's major competitors, such as Florida, Oregon and Mexico, have scaled back their production and/or targeted their production to supply niche markets. Over this time period, national sales to the processed strawberry market have also steadily given way to sales on the higher valued fresh strawberry market. Currently, California sales into both the fresh and processed markets total between \$500-600 million annually, making strawberries the 11th most valuable crop in the state (CA Dept. of Food and Agriculture).

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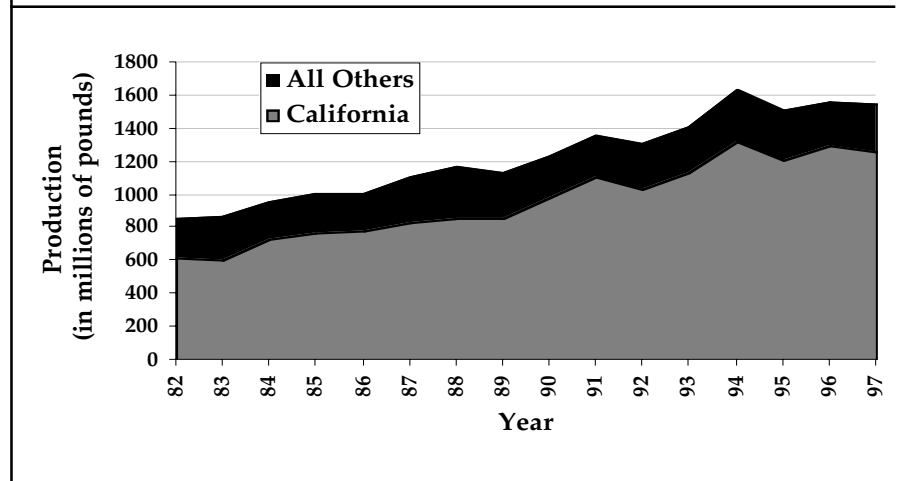
California dominates its nearest competitors in the national strawberry market, accounting for over 80% of national production (Figure 1). This is due to the combination of three factors: (1) a greater number of planted acres; (2) substantially higher yields, and (3) a significantly longer harvest season. Historically, while yields have fluctuated between 25 and 28 tons per acre over the last 15 years, California's share of national acreage has risen steadily from 28% in 1982 to 50% in 1997.

Yield improvements and acreage increases are the result of public and private investment and research efforts to maximize the advantage provided by California's favorable climate. Year-round production is possible because there are growing regions in both the northern and southern parts of the state, but the majority of California's volume is harvested from February through October. Growing areas in Southern California are traditionally harvested during the first half of the calendar year. Florida and Mexico are the primary competitors during the high-value winter months of November, December, January and February, but these fringe suppliers drop out of the market by mid-March when the warm weather in Florida and Mexico lowers quality. In the spring, harvests from Southern California overlap with harvests from Northern California, where the season is just beginning. During the summer months and into the fall, volumes from Northern California account for approximately 90% of the fresh strawberries sold nationally.

The recent introduction of new strawberry varieties extends California's harvest season into the high market price periods of early January and February. Due to increased production of the Camarosa strawberry, which is better adapted to cold weather, Southern California growers now harvest about 4 weeks earlier in the year. Introduced in 1995, the Camarosa variety produces a bigger, firmer berry over a longer period than the next most planted variety, the Chandler strawberry. Plantings of the Camarosa strawberry now account for 80% of the acreage in Southern California.

Historically during January and February, limited fresh substitutes and low U.S. production of strawberries have resulted in high fresh market prices. As these conditions change, prices for fresh strawberries

Figure 1. U.S. Strawberry Production



during these periods are likely to decline. For instance, California's season-maximum price (typically occurring in early February) fell in the early 1990s – coincident with the time when treefruits, table grapes and berries from the Southern Hemisphere producers, such as Chile and New Zealand, were first imported to the U.S.

As California strawberry producers increase production during high valued portions of the season, further declines in price should be expected. Lower prices in the early season due to expanded Southern California production have important implications for growers across the United States. In Florida, production costs per unit are higher and yields are lower than in California. Thus, increased California production and lower prices diminish the competitiveness of Florida strawberries. The increase in volume in the earliest weeks of the Southern California growing season may depress per-unit prices for both California and Florida growers. Figure 2 (shown on page 8) plots the seasonal price index for Southern California growers, showing that average fresh market prices during February and March have declined relative to the levels that existed before the widespread adoption of the Camarosa strawberry. Specifically, average fresh market prices in February declined from 2 times the yearly average price to 1.7 times. By expanding their season, Southern California growers will increase their total quantities sold. However, the evidence suggests that increased volumes have depressed prices in traditionally high priced periods, making the net effect on Southern California growers' revenues and profits unclear.

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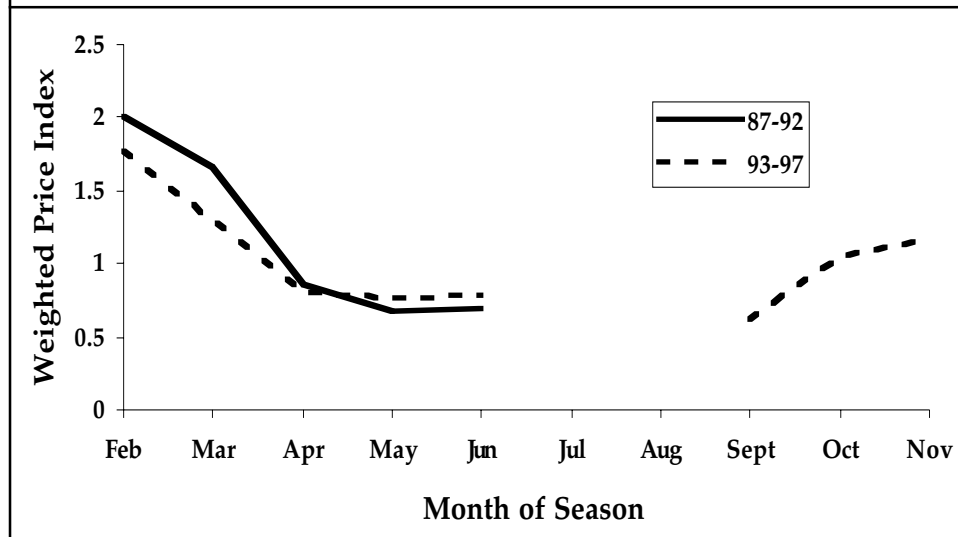
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Industry price patterns are affected by physical quality characteristics, such as flavor, firmness, size and shelf life associated with specific varieties. For example, some proprietary varieties attract a price premium of up to \$2.00 per 12-1 pint tray over the price of the more commonly produced "University varieties" such as the Selva, Chandler, Seascape and Camarosa strawberries. Characteristics for which retail buyers will typically pay a premium are:

1) better appearance (e.g., larger size and fewer blemishes); 2) longer shelf life; 3) marketing services; 4) brand identification; and 5) better flavor. Proprietary variety strawberries, such as those grown and marketed by the companies Driscoll and Well-Pict, generally command premiums from retail buyers for having the desired physical characteristics, the brand reputation, and the marketing services. However, premiums are based on physical and non-physical characteristics that are not necessarily restricted to proprietary varieties or the companies which market them.

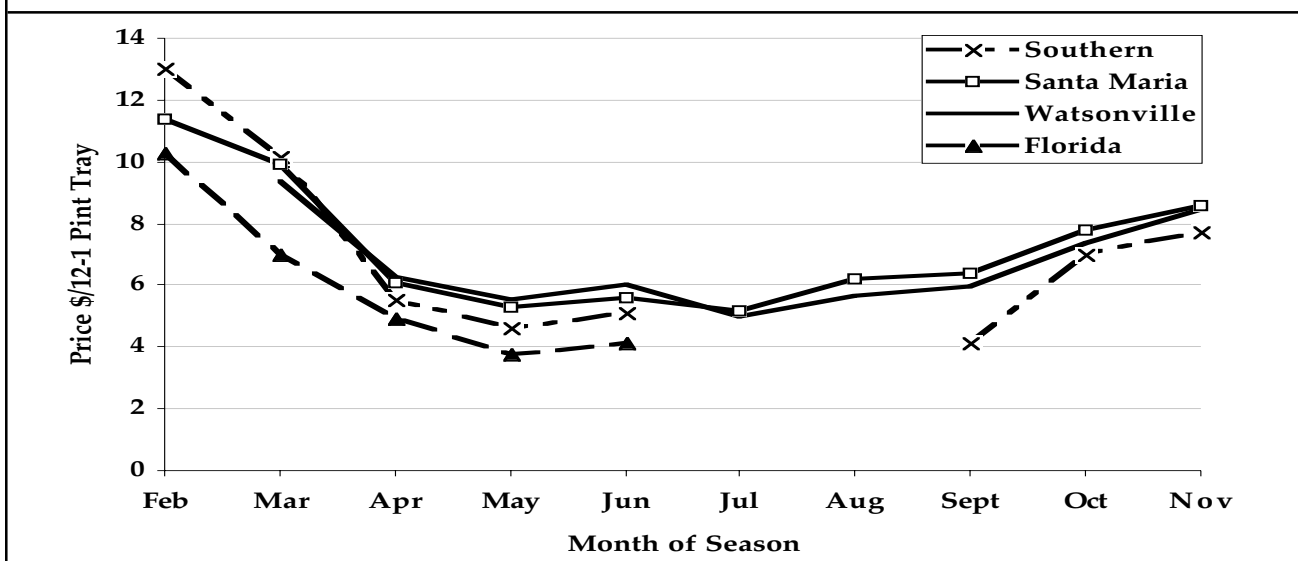
Figure 2. Season Volume Weighted Price Index: Southern California



For example, other non-proprietary varieties command premiums for their berries based on a combination of good physical characteristics, marketing services and brand reputation. The existence of quality-based price differentials provides growers with an alternative to traditional marketing.

Entrepreneurial growers use quality differences to target high price periods at the end of the season. In 1994, growers of a proprietary variety in Oxnard, California (a southern growing district) first instituted a second planting that yielded a second harvest season

Figure 3. Average Monthly FOB Price 1987-1997



to take advantage of a “market window” in late September, October and early November. This second season harvest introduces an additional supply source into a market period traditionally occupied only by northern California growers. Just as the Southern California growers rely on high prices during a few weeks at the start of the season, northern California growers rely on those few weeks of higher prices late in the season. Growers in Northern California enjoy a longer

harvest season than southern growers; however, they do not command very high prices on average. Fresh market prices in July and August are among the lowest received by northern California growers all year. Late September and October typically yield higher fresh market prices than the peak northern season months of March, April and May (Figure 3).

Quality differences between northern and southern berries are also a likely factor affecting prices in late September and October. Oxnard’s second season berries are the larger, firmer “new fruit” produced by plants at the beginning of their production cycle. This quality difference further enhances the desirability of Oxnard’s proprietary varieties over late season berries from the north. Thus, northern California growers will likely face reduced prices that are attributable to both increased overall volume and relatively lower quality fruit. The plot of the season index (Figure 4) for northern California growers, confirms that the overall price level has indeed declined since Oxnard instituted its second harvest season. For the period 1993-1997, the months of September, October and November have average index values markedly below the average index values for the same months during the years 1987-1992.

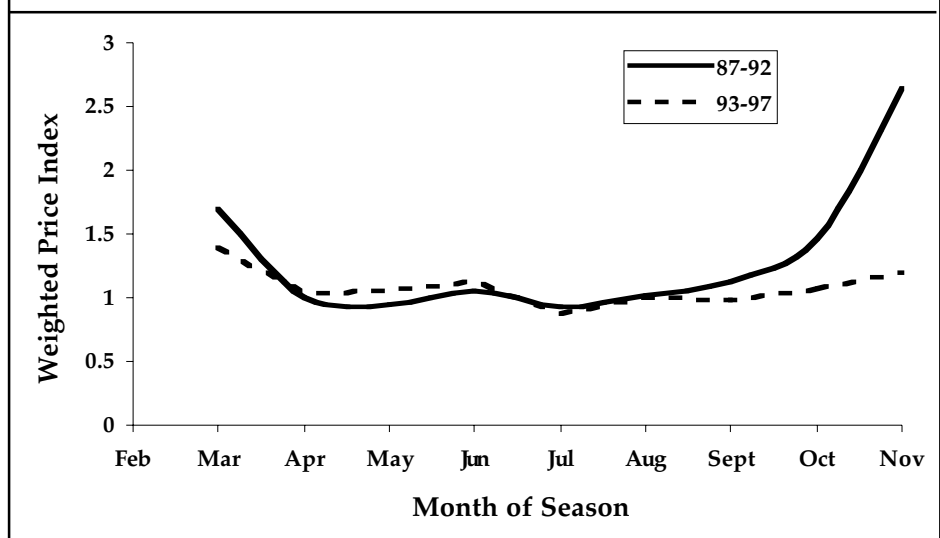
Similar effects occur at the end of the Southern California season – i.e., at the end of May and into June. Price differences between the processed market and the higher-valued fresh market keep lower quality berries from the south in the fresh market longer, thereby depressing the fresh market price for higher quality berries from the north. While berries from Southern California in May and June are smaller, less

firm, and less suited for the fresh market, retail buyers will buy them if the price is right.

Processing prices are traditionally thought to influence the volume available on the fresh market, particularly in June, when warm temperatures make southern strawberry quality marginal for sale on the fresh market. Recently, Southern California growers have adjusted to delay their exit from the high value fresh market. The planted acreage of proprietary varieties has nearly doubled from approximately 600 acres, accounting for 8% of the acreage in Southern California in 1993, to over 1200 acres, or 16%, in 1997. The premiums often paid for non-physical characteristics associated with these proprietary varieties may mitigate the differentials in physical quality between northern and southern berries and permit these growers to stay in the fresh market. Additionally, improvement of late season quality of non-proprietary berries in Southern California has been an additional benefit of the widespread adoption of the Camarosa strawberry. This variety produces a firmer berry over a longer period than other university varieties, allowing growers the flexibility to move between fresh and processed markets when market conditions permit.

As the California strawberry industry demonstrates, where boom-bust price swings occur because of seasonality of supply, incentives exist for growers to implement supply-side adjustments (when they are possible). Examples we have seen are:

Figure 4. Season Weighted Volume Price Index: Watsonville



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(1) the adoption of new varieties to capture niche markets; (2) adjustments in production practices to take advantage of market windows, and (3) utilization of quality differentials to remain in lucrative markets. It is possible that these supply-side adjustments may lower the seasonal boom-bust cycle of fresh strawberry prices. Smoothing, however, is achieved through the reduction of high prices. The possibility exists, then, that the strawberry industry's adjustments may lower industry profits. Consequently, there may be a trade-off between greater market stability and greater expected or average profits.

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Frank Han is a Ph.D candidate in the agricultural and resource economics department at UC Davis. He is writing his dissertation on the effect of pre-commitment agreements on price determination in the California strawberry market. Mr. Han can be reached at (530) 752-6770 or through e-mail at han@primal.ucdavis.edu.

Professor Colin Carter is a professor and the ARE Department Chair Dr. Carter can be reached at (530) 752-6054 or through e-mail at colin@primal.ucdavis.edu.

Rachael Goodhue is an assistant professor in the ARE department. Dr. Goodhue can be contacted at (530) 754-7812 or by e-mail at goodhue@primal.ucdavis.edu.

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their exceptionally high economic value provides strong incentives for conservation of stocks to assure a supply of trophy animals.

Culling Strategies. Culling elephants to reduce and control elephant densities is highly controversial. While some wildlife managers feel this is a necessary management strategy, prominent international organizations object to the killing of elephants for any purpose, and can bring substantial political weight to this position. To the extent that culling yields valuable products such as ivory, countries have incentives to cull, which could affect region-wide elephant densities and impose costs on their neighbors. Cooperative strategies for culling thus seem potentially beneficial.

Developed Country Assistance. Developed countries outside of Africa can also play important roles. First, they can police their own imports to enforce bans in listed animal products. Second, they have financial and human resources useful in design and implementation of wildlife management systems, an "in-kind" form of foreign aid. Third, to the extent that their citizens are willing to pay for the preservation of elephants in situ, they should contribute to management costs.

Conservancy Development. The willingness to pay for elephant populations in situ by the developed world places great burdens on local African communities located in elephant habitat. Greater elephant populations cause more problems with damage to crops, infrastructure, and people. Historically, relatively little ecotourism and hunting revenues have flowed to these people, who bear the greatest cost of maintaining large elephant populations. The revenues are captured by tour and concessions operators who typically live in

urban areas or outside Africa entirely. This increases incentives for locals to poach or otherwise defend against wildlife incursions.

Namibia has recently begun some exciting experiments aimed at reversing this problem, by allowing local villages to form "conservancies", that have broad powers over the management and utilization of local wildlife. This transfer of property rights to local residents provides needed incentives to maintain elephant and other wildlife stocks at the local level, because better conservation yields something for them. This helps "internalize" costs of elephants because it entitles the bearers of wildlife damage costs to a share in the benefits from those stocks.

Elephant-human interactions are many and various, with many positive and some negative dimensions. The conservancy concept seems to have great promise for helping resolve some of the conflicts while maintaining the prospect of healthy and viable elephant stocks.

Lovell (Tu) Jarvis is a professor in the ARE department at UC Davis. His interests include agricultural and economic development, food and nutrition policy, livestock economics, agricultural research policy and international trade. Dr. Jarvis can be reached at (530) 752-7221, or by e-mail at jarvis@primal.ucdavis.edu. You can visit Dr. Jarvis' Web page at www.agecon.ucdavis.edu/Faculty/Tu./Jarvis.html

Douglas Larson is an associate professor of agricultural and resource economics at UC Davis. His fields of interest include applied welfare economics, economics of risk and information, nonmarket valuation and environmental and resource economics. Dr. Larson can be contacted by telephone at (530) 752-3586 or by e-mail at larson@primal.ucdavis.edu. Visit Dr. Larson's Web page at www.agecon.ucdavis.edu/Faculty/Doug.L/Larson.html