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THE SUPPLY CHAIN OF FRESH VEGETABLES IN THE US Part I: Supply Chain Operations and Challenges

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In the second of 3 articles Silvia Estrada-Flores, winner of the 2008 Logistics Development Award sponsored by CHEP Asia-Pacific, explores the challenges involved in the supply chain of fresh vegetables in the US.

As any farmer in Australia or in the US can tell you, the production of fresh vegetables is a business that requires a delicate handling of both product and supply chain strategy. And even then, things can go wrong. In 2006 a multi-state food poisoning outbreak in the US from shredded iceberg lettuce led to 53 hospitalizations. In January this year, California's Central Valley was under the effects of a severe draught that led to an estimated \$1.6 billion loss in wages across the valley. At the time of writing this article, we are yet to see the full extent of this drought on the prices of fresh vegetables in the US.

In October 2008, I visited five vegetable processing operations in California. I had a very good reason to centre my visits in the Salinas and Soledad areas: about 85 % of the US leafy green vegetables are grown in the Salinas Valley (California) in summer or around Yuma (Arizona) in winter.

My visits, sponsored by the Logistics Association of Australia and CHEP Asia-Pacific, included River Ranch Foods, Taylor Farms, Dole Fresh Vegetables, Foxy Produce (The Nunes Company) and New Star Fresh Foods. In these companies, I had the opportunity to see first-hand the supply chain operations (from harvest to distribution) of whole and fresh-cut vegetables.

Maria Ventura (Manager of Field Quality Assurance, River Ranch Fresh Foods), showed me around the River Ranch fields during the late harvest season in Salinas. Some twenty workers, standing at each side of a large harvesting line, were collecting lettuce from the fields at a remarkably fast pace on a hot summer day. The workers were fully concentrating on the task at hand: cutting the lettuce, trimming the outer leaves, removing the core, placing the lettuce in a washing line and placing the heads in a lined plastic bin with a volume of about 340 kg. The knives used for harvesting were continuously washed in chlorinated water.

The synchronization of the workers on these tasks was outstanding. Although some growers are moving towards mechanising harvesting operations, a number of processors in the USA have found that mechanical harvesters provide an inferior lettuce quality for fresh-cuts due to mechanical damage. Therefore, semi-mechanical operations are still predominant in Salinas. In these types of operations, a tractor-driven conveyor belt moves the washing and packing line as the crop is being harvested. The washing line sprays chlorinated water (at a concentration of 200 – 250 ppm) on the harvested lettuce and workers pack the lettuce heads in bins or boxes, as per market requirements. River Ranch processes Romaine, Iceberg, broccoli, cauliflower, cabbage, and spinach for private label, "River Ranch" brand and "Popeye Fresh!" brand salad kits.

According to Thomas Mack (VP Technical Sales, Dole Fresh Vegetables), one of the greatest challenges in the lettuce processing business is the coordination of planting, harvesting, processing and shipping of large volumes of highly perishable product. Dole is acutely aware of the importance of time on the value chain of fresh vegetables. The company aims to harvest, process and ship 100,000 boxes (or over 1 million bags) of salad per day in 24 hours or less. Forecasting of demand involves weekly planning meetings, but day-to-day re-adjustments are needed to handle the volume of orders. Dole recently introduced plastic pallets with RFID tags, which enables Dole's staff to track the product along the chain. For example, the cold stores in the Soledad plant have an antenna that registers the time of entry of pallets into storage, thus allowing back calculation of the time spent between harvest and cold store for quality assurance and supply chain management purposes. Dole concentrates on its own label and does not currently pack lettuce for private labels. The business is truly global: Dole Fresh Vegetables sources its products mainly from

North America. As a global company, Dole has operations in Asia, Europe, Australia, New Zealand and Mexico. The company operates four fresh vegetable processing facilities in California, Arizona, Ohio and North Carolina. Dole also supplies domestic buyers and exports fresh vegetables to Canada and Japan, among other countries.

Taylor Farms supplies fresh cut lettuce mainly to American foodservice institutions such as McDonald's, Subway, Burger King, Jack in the Box, Olive Garden and Red Lobster. This part of the business represents more than US\$750 million. Matt Modena (VP Business Development, Taylor Farms) explained that the weather conditions in Salinas are well suited for lettuce growing. Summer in Salinas is traditionally mild, with temperatures around 20 °C. The difference between ocean and air temperature creates heavy morning fog during the summer months, thus protecting the crops from extreme solar radiation. Once the lettuce is received from the field, a quick cooling is required before sending the product to either cold storage or refrigerated trucks/containers. This is normally accomplished with a vacuum cooler (Figure 1), which cools a full load of product to 2 °C in about 20-40 minutes, depending on the size of the load. At the processing plant, lettuce heads are trimmed further, cut or shredded, triple-washed (in the case of ready-to-eat salads), packed in bags and set to storage. This storage phase is meant to last only a few hours, as the aim is to transport the finished product within a few hours to retail or foodservice. Short time frames at processing mean longer shelf-life at foodservice/retail, and processors need to adjust their operations to leave at least 10 days of shelf-life for the buyers. The total shelf-life for fresh-cuts under the best circumstances is 14 days, from harvest to consumption. For whole lettuce, shelf-life may extend to three or four weeks.

Every November, growers, processors and distributors move their operations from Salinas to Yuma. Logistics personnel work under tight schedules to dismantle, pack and transport entire harvesting (and occasionally, processing) lines between the two States, to later re-assemble them in the new site. Some field and processing plant staff also travel the 965 km between the two cities, but hiring new staff is normally required in Yuma. Training is performed on the fields and the learning curve can lead to a decrease in productivity of up to 50% until the necessary skills have been mastered.

Lettuce consumption trends indicate that the demand for pre-packed lettuce salad at foodservice and retail has not peaked yet. In 2007-2008 sales of packaged salads

increased by 5%, while whole lettuce sales decreased by 3%. This shows a switch in consumer preferences in favour of healthy, more convenient food presentations. The effect of private labels (PLs) also needs to be acknowledged: from 2006 to 2008, PLs increased their market share in 3% and now have 14.5% of the total US salad market. PLs compete with the five top firms in the US, which jointly hold 82% of the salad market .

To maintain market conditions, supply chain professionals dealing with perishable foods need to maintain an eye on food safety, as bagged salads are items that consumers would stop buying in response to food safety concerns. This behavior was demonstrated in the US 2006 outbreaks traced back to contaminated bagged spinach salad, where sales of all fresh spinach presentations (i.e. not only packed) declined. Spinach harvesting, distribution and sales ceased, as stores and restaurants cleared bagged spinach from their shelves and refrigerators. US grown fresh spinach was not sold for 5 days. Further, spinach from the affected area in California was off the market for an additional 10 days.

Managing the risks arising during the supply chain of delicate food products with a short shelf-life requires a multi-disciplinary team that combines postharvest, regulatory and engineering knowledge, in addition to logistics and operations theory and practice. Further, a whole-of-the-chain management approach needs to be applied, regardless of where the company is placed in the supply chain (e.g. grower, processor or retailer). I saw evidence of this approach in the Salinas lettuce industry, which is able to feed a complex market of over 300 million people. Their approach must add up to a good thing!

In my next article, I will discuss the food safety and environmental challenges faced by the lettuce processing industry in California.

1 Cook, R. 2008. Trends in the marketing of fresh produce and fresh-cut products. Presentation, UC Davies.64 p.

2 Calvin, L. 2007. Outbreak linked to spinach forces reassessment of food safety practices. Amber Waves: the economics of food, farming, natural resources and rural America. Available at: <http://www.ers.usda.gov/AmberWaves/June07/Features/Spinach.htm>



Figure 1. Vacuum cooler in Taylor Farms, Salinas (CA).