Know-how for Horticulture™

Understanding the retail performance of broccolini using a tool for determing in store performance and consumer demand

Marie Piccone
Piccone Horticultural Consultancy Pty Ltd

Project Number: VG03100

VG03100

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Know-how for Horticulture™

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Understanding the retail performance of broccolini using a tool in store performance and consumer demand – VG 03100

Final Project Report

August 2005

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This report contains data collected by Sydney Post Harvest Laboratory, Perfection Fresh Australia and Piccone PHC. The data was analysed by Piccone PHC and Elanza Australia Ltd.

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Key Findings

Consumer Survey

- Over 50% of consumers interviewed bought broccolini once a month or not at all.
- 22% came to the store with the intention of buying broccolini.
- The participants indicated that their in-store decision to buy broccolini was predominantly influenced by the quality available (94%), quality of the display (59%) and the price (44%) while the price of other vegetables only had an affect on the buying decision of 9% of those surveyed.
- Most of the survey participants indicated that the quality was the most important factor in their decision to buy. Within quality:
- Most rated colour and firmness of broccolini stems as important to overall broccolini quality.
- 69% rated the amount of yellow flowers as important to overall broccolini quality.
- Other quality attributes such as stem straightness, length and numbers within a bunch were not considered important.
- 47% of those surveyed indicated that they were still prepared to buy stems that were severely bent.
- Only 9% of those surveyed were prepared to buy broccolini bunches with severe stem damage or high numbers of flowering heads.
- 78% of those surveyed use broccolini steamed, 53% stirfry, 3% eat it raw or in salad.
- A quarter of participants thought that broccolini was not a genetically-modified product.

Supply Chain Temperature Management

- In the trial temperature conditions for the Perfection fresh broccolini were ideal from the packhouse to the retail store.
- There is still some uncertainty of temperature control over the period from harvesting to packing broccolini into boxes as temperature monitoring in this trial only began after the broccolini were packed for transport
- Retail display temperatures were not measured but in-store monitoring suggested that length of time on display of 3 days or less in normal, air-conditioned conditions resulted in minimal product deterioration especially compared to long periods of time on display and being handled

Retail Stores Programme

- Based on the location of broccolini in-store in each of the 3 stores up to a quarter of the passing customers stopped in the vicinity of the broccolini display suggesting that the display locations are currently in areas where exposure is probably not an impediment to sales.
- Changing the price of the broccolini and the size of the display did not increase the number of people who stopped in the vicinity of the broccolini display.
- In all three stores the additional volumes sold at retail prices between $1.97 per bunch and $2.99 per bunch were much higher than volumes sold at retail prices over $3 per bunch. Depending on the individual store location, volumes sold were higher at $1.97 per bunch than $2.49 per bunch while at other locations volumes sold at retail prices between $2.29 and $2.99 were as high as sales at $1.97 per bunch. The location and demographics of the store appeared to influence these results. Sales at $3.49 per bunch were always very slow.
- A larger number of customers purchased broccolini twice in 4 weeks instead of once or less when the price was dropped from $2.99 per bunch to $2.29 per bunch.

- Profitability for the retailers - in terms of weekly profit and profit per square metre - was far higher when the price was between $1.97 and $2.99 per bunch because sales volumes increased significantly. Profitability was significantly lower when the retail price was $3.49 per bunch. Generally speaking the highest profits were achieved at retail prices of $2.29 to $2.49 per bunch.
- Product quality was influenced by the length of time that the broccolini was displayed on the shelf. Time on display was related to product rotation practices and the size of the display. The research also showed that the size of the display did not significantly influence sales volumes provided the display was not 'empty looking'. Monitoring also showed that the best product quality was achieved by product rotation and high sales volumes which ensured that broccolini was only on display for a maximum of 3 days.
- The results showed that 'poor quality' product was found on the shelf for the longest periods of time. This indicates that a significant number of consumers did select product that did not have the quality defects of yellowing, loss of stem firmness, bent stems and stem damage. Changes to the retail price and the size of the display did not change the fact that 40% of people who actually picked up broccolini from the display also put it back and did not buy. The reason for this may be in part attributable to dissatisfaction with the quality or some other uncertainty about the product and associated factors. The store with the most efficient product rotation also had the highest sales for the duration of the project
- The results of the project show that 30% of consumers who purchase broccolini also purchase broccoli in the same transaction and that about 25% of consumers purchase asparagus and broccolini at the same time. Broccoli bunches (which were generally priced at $1.99 per bunch and have fluctuating availability) are not in the 10 products most commonly purchased in the same transaction with broccolini. These results indicate that there are about a third of consumers who buy broccolini with broccoli and/or asparagus. It also points to the fact that the other 70 to 75% of consumers are purchasing one or the other of these products in any one transaction. The conclusion is that broccoli bunches (priced at $1.99 per bunch) are strong competition to broccolini if and when they are present while there is also a degree of competition that influences sales volumes between broccoli, broccolini and asparagus.
- Retail price of broccoli and asparagus was not directly related to sales volumes in any one week. High prices did not necessarily correlate with lower sales volumes and vice versus. There was not a consistent strong relationship between sales volumes and retail price. Even at 99 cents per bunch asparagus sales were not necessarily increased or directly proportional to price. This suggests that other factors such as product quality, timing, competition and consumer perception were also influencing consumer buying patterns.
- It is significant to note that the store that had the highest broccolini sales by far had 2 broccolini displays – one located beside the broccoli display and the other located in a prime display position located in the 'aisle' adjacent to the passing traffic in the shopping centre. This store also did not stock broccoli bunches at all during the duration of the project. One of the significant implications of this scenario for retailers is to analyze the profitability of broccolini versus broccoli bunches. Depending on the outcome of this analysis, encouraging higher sales of broccolini may in fact be a significantly more profitable option.
- Broccolini sales were definitely higher or much higher during March 2005 than during September, October and November 2004. It is difficult to analyze the relative importance for the reasons for this that could include the difference in the time of the year, the changes in the competition and whether broccolini sales are increasing over time as consumer awareness and product penetration increases. Continued monitoring of the sales pattern would ascertain the annual and longer term trends in terms of broccolini sales and volumes.
- Sales volumes recorded on Easter Thursday were significantly higher than any other Thursday or individual day during both phases of the project. These higher sales were evident everywhere and were not closely related to the retail price. This data suggests

that broccolini is a ‘special occasion’ purchase. On these special occasions there is far less price sensitivity and a greater number of consumers purchasing broccolini. The results also suggest that there is a group of consumers who are aware of broccolini but do not buy it on a regular basis. Awareness of the product is more widespread than ‘normal’ everyday data would suggest. The opportunity for PFA is to capitalize on broccolini’s position as a ‘special occasion’ product while also increasing the frequency of regular purchase. There are two distinct market segments (based on perception) that are available at this point in time.

- In-store promotions definitely increased broccolini sales during the day of the promotion but there was not enough data to be able to determine whether there was any additional benefit in terms of longer terms sales increases. The in-store promotions did not show any obvious improvement in sales in the days and weeks after the promotion. It is highly likely that there is a positive effect from the promotions but it was not possible to measure the extent or value of this.

Outcomes and Recommendations for Broccolini Suppliers

- Quality is an important aspect of consumer acceptance. Overall, product quality is maintained from the packhouse to delivery to retailers. Retailer education and 'user friendly' information on maintaining quality at retail (recommended handling and time on display etc) will have the most impact on the quality that the consumer is offered. This may involve a strategy that involves participation from the entire supply chain (eg further information placed on packaging etc).
- Temperature management as monitored in this project is optimal and is not affecting product quality except at retail.
- The in-store programme demonstrated that the lowest retail price does not result in highest sales in most situations. Retailer profitability is higher when the GP% is slightly lower but the sales volumes are much higher. A retail price of $3.49 per bunch 'kills' sales. The pricing information provides the opportunity for Perfection Fresh Australia to influence retailers to merchandise broccolini to ensure highest profit for their own businesses and other businesses involved in the production segment of the supply chain. It also provides the opportunity to demonstrate strategies including optimal retail pricing, positioning of the display, size and fullness of the display to increase sales and consumer satisfaction.
- The project has demonstrated that there is strong potential to increase retail sales with 'clever' informed merchandising involving pricing, positioning in-store, size of the display and continuing improvement. A key element is retailer awareness and education in terms of the potential profitability of broccolini, the benefits of particular handling practices and the quality requirements and purchasing habits of their customers.

Outcomes and Recommendations for Perfection Fresh Australia

- By utilizing the new information generated from the project, there is considerable scope to continue educating retailers on the range of benefits to be gained from strategic retailing in terms of consumer satisfaction, increasing sales and improving profitability. The project results highlight the potential of broccolini to be a profitable line provided it is merchandised appropriately.
- It is recommended that PFA consider a campaign to highlight the value of broccolini in the retail fresh mix. The campaign could also use the results to demonstrate to strategies to increase broccolini sales and consumer satisfaction. Recommendations **for trial** by retailers to increase broccolini sales include pricing according to the project results - $2.29 to $2.49 per bunch in many cases while $2.99 per bunch is productive in many situations also. Other initiatives worth trialing are ensuring that product quality is not being lost due to excessive time on the shelf, maintaining a "full" display, placing the broccolini beside the broccoli and trailing a second display in a prominent position on the perimeter of the store (but not "lost" within a fruit section).
- In order to understand the competitive position of broccolini and other products better it would be highly advantageous to determine the relative profitability of broccolini compared to other products in store. This comparative data (depending on the results) may be used as a key driver to demonstrate the importance of broccolini and encourage retailers to place more emphasis on developing its potential.
- Broccolini is currently perceived and purchased by consumers as a 'special occasion' purchase and also as a purchase that is regularly on the shopping list. PFA marketing and promotional activities would be best aimed at both these market segments (and perceptions) to increase and maintain high levels of sales for 'special occasions' and at the same time to increase the frequency of 'regular, everyday' purchases. Information on uses, exposure to foodservices and retail, in-store promotional activities and other strategies can all be engaged to capitalize on the current situation.

- The product's physical image needs to be reviewed in light of the results. It may be that further information on the quality attributes which are not defects and don't adversely affect quality needs to be conveyed via PFA promotional material and activities eg yellow flowers are a characteristic not a defect, bent stems are 'normal and attractive'.
- Further investigation of current consumer reaction and trends relating to genetic modification of food needs to be conducted. It may be that the lack of consumer knowledge that broccolini is not genetically modified is or will be an impediment to current sales and future growth.

Outcomes and Recommendations for Retailers

- Strategic merchandising – including retail pricing that enhances sales volumes, encourages consumer acceptance and is also most profitable – is highly advantageous in terms of increasing sales, attracting new customers and possibly increasing store visits and purchases by existing customers. Other merchandising strategies that are highly likely to enhance sales and retail performance of broccolini include display times on the shelf of 3 days or less, maintaining a 'full' display and possibly displaying broccolini beside broccoli. Additional sales may also be gained by doing a second 'drawcard' display where passing traffic external to the store may be attracted.
- It is important for retailers to review the results that show that high turnover at very low prices and/or low turnover at very high prices are not conducive to best retail profit and consumer satisfaction for new and expanding products like broccolini.
- Product quality is also of paramount importance and consumers are at the stage where they have some knowledge and opinions of what they think constitutes "good quality". Based on the survey results, they are mistaking some of the broccolini quality attributes for defects. This may be associated with their knowledge of broccoli and the mistaken belief that defects for these two products are the same of similar. Sales and profits will be increased if retailers can collectively work with or cooperate with PFA to educate consumers about quality and care of broccolini.

Project Objectives

- To better understand aspects of consumer awareness and product knowledge of broccolini and to thereby identify strategies most likely to increase sales or add to perceived value
- To better understand the competitive position of broccolini in relation to broccoli and asparagus through benchmarking broccolini against broccoli and asparagus in terms of consumer behaviours as differing relative price points
- To optimize product quality by measuring consumer response to different offerings
- To evaluate alternative options for promotion and for presentation at point of sale.

Introduction

Product performance, retail performance and consumer behaviour were investigated in independent specialist fruit and vegetable outlets in Sydney.

Three independent stores were involved in the project. This report outlines information related to each of those stores. The data collection tools and techniques used in the stores were the image analysis of buyer movements near the broccolini, interactive shelf analysis (using a load cell), analysis of transaction data, monitoring of in-store characteristics and quality and product rotation measurements. In addition, a consumer survey was conducted in the shopping centre were Store 1 was located. An investigation of temperature management from suppliers' packhouses to the retail stores was conducted.

In late 2004 during the months of August, September, October and November, phase 1 (known as the benchmarking study) was carried out to establish current sales and customer activity for that time of the year and situation. Then in early 2005 during phase 2, (Weeks 10 to 14, 28/02/05 to 03/04/05) the following interventions were made:

- The price was lowered to specific points and then lowered again – the exact details specific to each store are outlined in the sections on each store.
- The store's signage was added to the display to alert customers to the special price.
- In-store promotions were carried out on three occasions.
- Display size was increased.

Consumer Survey Results

A survey was performed to help provide insights into consumers understanding and buying patterns of Broccolini.

As expected for a niche product a large number of people had to be approached in order to contact a reasonable number of people familiar with the product and able to usefully answer the questions. In this case, of the 172 people approached, 20% of the people had previously seen broccolini and also chose to fill in the survey.

A range of questions were asked about demographics, broccolini quality, purchasing and intended use as detailed in Appendix 1. This survey included presenting participants with three sets of photographs relating to broccolini flowering, stem straightness and stem damage and they were questioned on their willingness to buy the broccolini in the photographs. The following summarizes the results.

Demographic

The demographic profile of the participants is summarized below. These statistics are likely to be biased due to the location of the survey inside a mall close to specialist stores.

- 88% of survey participants were shopping for a couple or a family and a quarter of these participants were male.
- The average age of surveyed shoppers was between 35-50 years.
- 91% of those surveyed bought fruit and vegetables from a specialist fruit and vegetable store at least once a week.
- 56% bought fruit and vegetables from a supermarket.

Broccolini Buying Habits

- Over 50% bought it once a month or not at all.
- 22% came to the store with the intention of buying Broccolini.
- The participants indicated that their in-store decision to buy broccolini was predominantly influenced by the quality available (94%), quality of the display (59%) and the price (44%) while the price of other vegetables only had an affect on the buying decision of 9% of those surveyed.

Quality

Most of the survey participants indicated that the quality was the most important factor in their decision to buy. Within quality:

- Most rated colour and firmness of broccolini stems as important to overall broccolini quality.
- 69% rated the amount of yellow flowers as important.
- Other quality attributes such as stem straightness, length and numbers within a bunch were not considered important.
- 47% of those surveyed indicated that they were still prepared to buy stems that were severely bent.
- Only 9% of those surveyed were prepared to buy broccolini bunches with severe stem damage or high numbers of flowering heads.

Use

- 78% of those surveyed use broccolini steamed
- 53% stirfry
- 3% eat it raw or in salad.

Genetically Modified

A quarter of participants thought that broccolini was not a genetically-modified product.

Appendix 1 contains the questionnaire used for the survey.

Broccolini Supply Chain Temperature Management

(This section prepared by Sydney Post Harvest Laboratory)

Introduction

The objective of the Perfection Fresh-Broccolini trial was to monitor temperature variability of Broccolini bunches from the grower (packhouse) through to the retail store. Even brief exposures to changes in temperature can potentially cause a significant decrease in shelf-life and postharvest quality. During the trial, temperature data were collected at regular intervals using loggers (see Fig. 1) placed in polystyrene boxes containing the Broccolini. Logging intervals of 10 min were used to ensure accurate monitoring of temperatures, as well as to provide a comfortable maximum logging duration of 16.9 days. In addition, information sheets (labels) requesting harvest/transit dates, comments etc were provided to participants to complete.

The trial involved 2 growers and 3 retail stores -

Growers:
- Joe Vizzari, Kooweerup, VIC
- Tony Wright, Meerlieu, VIC

Retail stores:
- Penrith Plaza Growers Market, Penrith, NSW
- Fruit Ezy, Chatswood, NSW
- Losurdo's, North Ryde, NSW

Growers were provided with 3 loggers, which were placed in boxes during packing of Broccolini (1 logger per box) and forwarded via the Perfection Fresh Distribution Centre to the 3 retail stores. Each retail store received two boxes of broccolini with loggers, each from a different grower. Soon after the trial ended, Sydney Postharvest Laboratory collected the loggers (and information sheets) from the retail stores and downloaded the temperature data.

Fig. 1 Temperature logger with orange strip used to log temperatures of broccolini during the trial

Results

Harvest, pack and arrival dates of broccolini as recorded on the labels are listed in Table 1. In general, broccolini were packed into boxes (with ice) within 2-3 days of harvest. Transport to the retail stores then took approximately one day, however transfer times at Perfection Fresh Warehouse Homebush and/or Perfection Fresh sales stand at Sydney Markets were unobtainable as no information was recorded on the labels.

Figures 2 and 3 describe the temperature profiles of broccolini conveyed from growers to the retail stores. The distinct temperature spikes on 10 March designate when growers packed broccolini into boxes for transport (spikes were caused by participants immersing loggers in warm/hot water for 20-30min), whereas temperature spikes on 11-12 March show when Broccolini were unpacked for retail display. Please note that the data log file for Broccolini dispatched by Joe Vizzari to LoSurdo's (Logger 2) was corrupt and could not be retrieved for analysis, possibly because the logger was damaged during transit or when it was immersed into hot (boiling?) water.

	Grower: Joe Vizzari			**Grower: Tony Wright**		
Temperature logger	**1**	**2**	**3**	**4**	**5**	**6**
Harvest date:	Mar 7	Mar 7	Mar 7	Mar 8	Mar 8	Mar 8
Pack date:	Mar 10	Mar 10	Mar 10	Mar10 +	Mar10 +	Mar10 +
Perfection Fresh Warehouse Homebush	na*	na	na	na	na	na
Perfection Fresh Sales Stand Sydney Markets	na	na	na	na	na	na
					-	-
Penrith Plaza	Mar	-	-	Mar	-	-
Arrived:	11	-	-	11	-	-
On display:	Mar 11	Mar	-	Mar 11	Mar	-
LoSurdo's		11	-		11	-
Arrived:	-	Mar		-	Mar	
On display:	-	11	Mar	-	12	Mar
Fruit Ezy			11			11
Arrived:	-	-	Mar	-	-	Mar
On display:	-	-	11	-	-	11

* indicates information not available
\+ packed at 7am

Table 1 Transfer dates of broccolini from growers through to retail stores

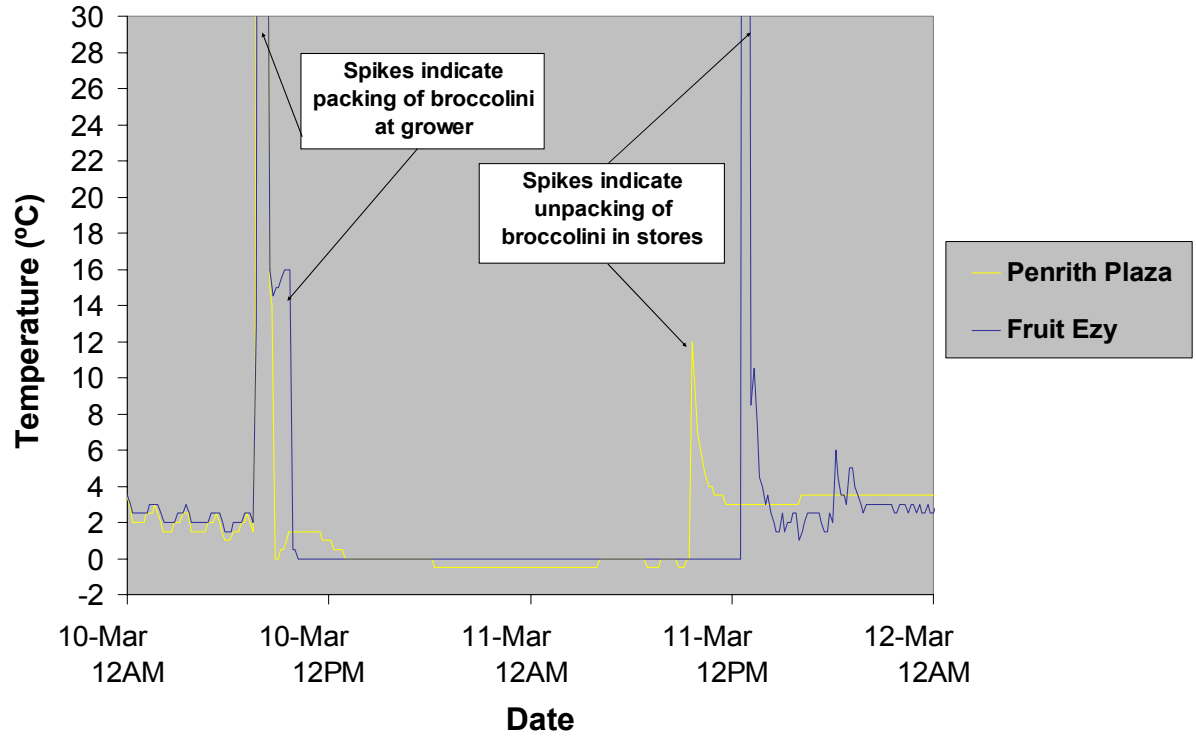


Fig 2. Temperature profiles of broccolini dispatched by Joe Vizzari to retail stores

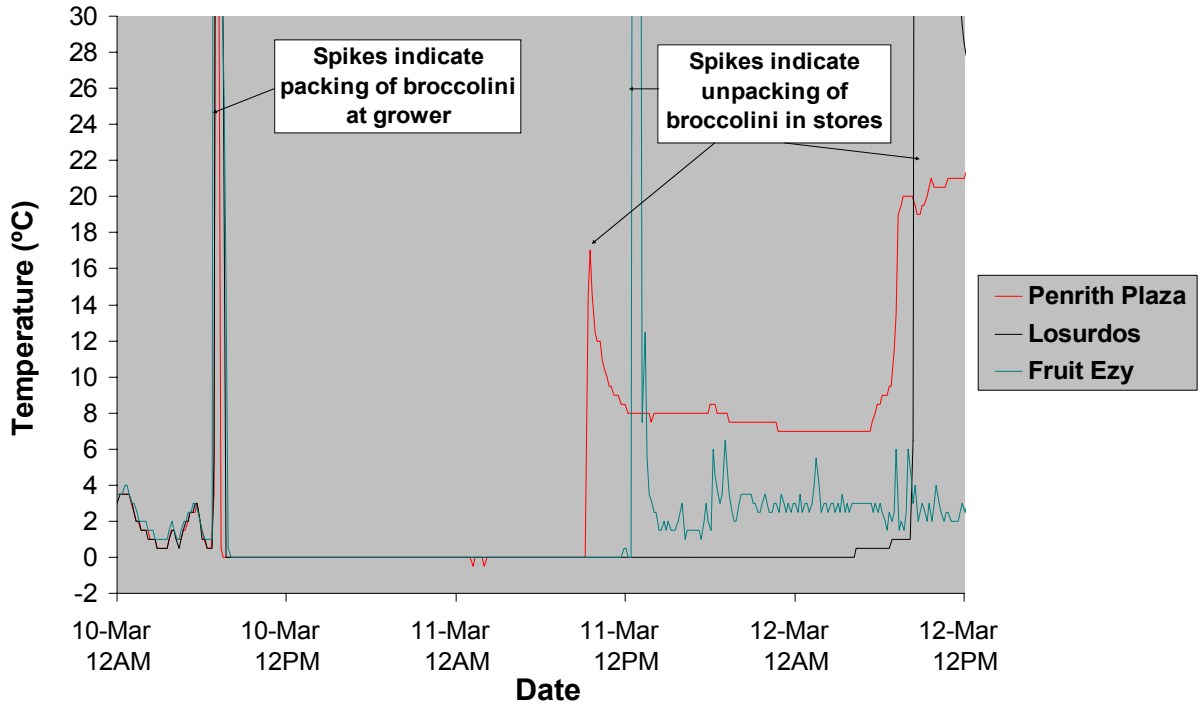


Fig 3. Temperature profiles of broccolini dispatched by Tony Wright to retail stores.

During transport, temperature conditions were quite stable and generally ranged from -0.5ºC to 0.5ºC, although a slight rise in temperature (to 1.5ºC) was present in broccolini destined to Penrith Plaza (see Fig. 2). This increase occurred in the first 2-3 hours of the trial, most likely whilst Joe Vizzari was packing broccolini on the farm. Low mean transit temperatures (-0.1 to 0.1ºC) and narrow confidence intervals (as calculated over 10 min intervals) also indicated favourable conditions for broccolini transport with very little variability in temperature (Table 2). These results suggest that the ice covering the broccolini in the boxes continually maintained temperatures at or near 0ºC from the grower all the way through to the retail stores.

Journey (grower → in-store display)	**Mean Temp. (ºC)**	**Confidence interval (0.95)**	**Time taken (hr)**
Joe Vizzari → Penrith Plaza	-0.1	0.10	24.5
Joe Vizzari → Fruit Ezy	0.0	0.01	26.5
Tony Wright → Penrith Plaza	0.0	0.01	26.0
Tony Wright → Fruit Ezy	0.1	0.02	28.5
Tony Wright → LoSurdo's	0.1	0.01	48.5

Table 2. Temperature conditions and journey times of broccolini dispatched to retail stores

In addition, the transit times as measured by the loggers correspond to discussions with retail store personnel, who said that broccolini were displayed soon after arrival (*i*.e. 11 March), except at LoSurdo's store, which placed broccolini (from Tony Wright) into storage until 12 March.

Conclusions

Cool chain management is an important strategy for stabilising postharvest quality of horticultural commodities. In this trial, temperature conditions for the Perfection Fresh broccolini were ideal from the packhouse to the retail store. Logged temperatures were virtually always 0 $\pm$ 0.5ºC, which would effectively minimise metabolic activity (respiration) and loss of chlorophyll (yellowing) in broccolini. In addition, packing broccolini in crushed ice would help to maintain its turgidity (firmness) by providing moist conditions, as well as to cushion broccolini from bruising and blemishes caused by 'rough' transportation. However, there is some uncertainty of temperature control over the 2-3 day period from harvest to packing broccolini into boxes - temperature monitoring in this trial only began after the broccolini were packed for transport.

In-store Component of the Project

Store 1

Background

In late 2004, phase 1 (known as the benchmarking study) was carried out to establish current sales and customer activity for that time of the year and situation. Then in early 2005 during phase 2, (Weeks 10 to 14, 28/02/05 to 03/04/05) the following interventions were made:

- The price was lowered from $2.99 to $2.49 for five days in Week 10 and then lowered again to $1.97 for Week 11 and most of Week 12 then rose back to $2.99 around Easter.
- The store's signage was added to the display to alert customers to the special price.
- In-store promotions were carried out on three occasions.
- Display size was doubled in Week 11.

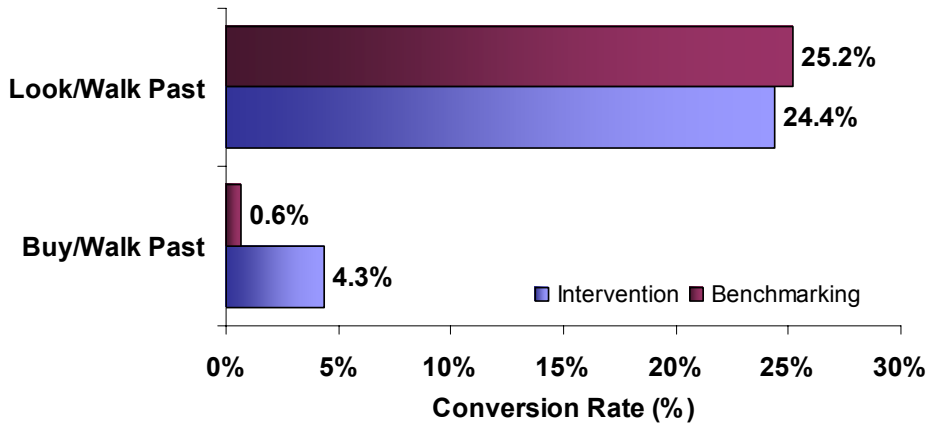
Three independent stores were involved in the programme. This report outlines information related to Store 1. The data collection tools used in the store were the image analysis of buyer movements near the Broccolini and analysis of transaction data, quality and product rotation measurements.

Conversion Rates

The conversion rates were determined using the image processing equipment. Primarily this measured the total traffic past the Broccolini which includes all staff and customer movement and is dependent on the size of the 'zones' (ie mask, interest and item) that are set up in the image processing analysis. To some degree, the system also measures the number of people who stop and look at the Broccolini. This measurement has some limitations due to the very narrow display used, slight movement of the position of broccolini display each time displays are redone, and the effect of any changes in the products displayed around and beside the broccolini. It is not possible to be certain that customers have paused specifically to look at the broccolini.

Average Conversion Rates – Store 1

The average conversion rates during phase 1 and phase 2 for Store 1 are shown below. A quarter (about 25%) of the traffic walking past stopped and looked at the Broccolini (and this does not change between phases). However the number of customers who walk past and convert to a purchase increased from 0.6% to 4.3% (shown clearly in the scan data sales).



These measurements suggest that there is a potential pool of a quarter of the customers who pass the broccolini who stop momentarily in the vicinity of the product. When the price was lowered and there was information alerting customers to the 'better deal' the conversion rate - walk past to buy – increased from 0.6% to 4.3%. The total number of customers who interacted (touched or placed their hand over the display) with the Broccolini did not increase by more than 3%.

Product Quality

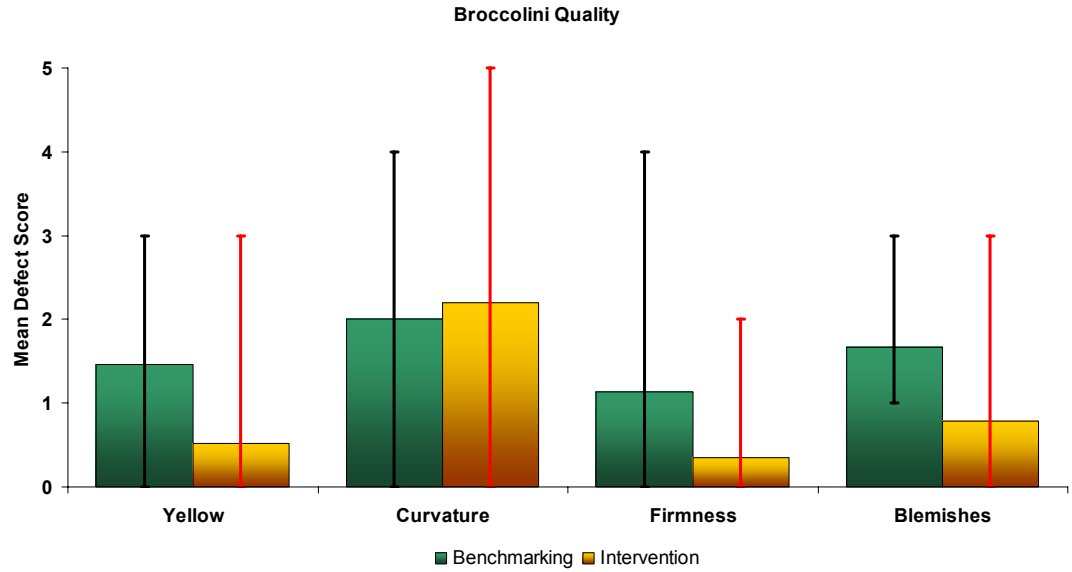
Broccolini product quality did vary from excellent (0 score for defects) to unacceptable (5 score for defects) during phase 1 and phase 2. It is important to note that the average yellowing, curvature, firmness and blemishes on average were all ratings of 2 or better but that the range included some significantly poor quality product in terms o fall 4 quality parameters within the displays.

This needs to be considered in light of the consumer survey results. Most of the survey participants indicated that the quality was the most important factor in their decision to buy.

Within quality:

- Most rated colour and firmness of broccolini stems as important to overall broccolini quality.
- 69% rated the amount of yellow flowers as a problem
- Other quality attributes such as stem straightness, length and numbers within a bunch were not considered important.
- 47% of those surveyed indicated that they were still prepared to buy stems that were severely bent.
- Only 9% of those surveyed were prepared to buy broccolini bunches with severe stem damage or high numbers of flowering heads.

It is highly likely that when wide variation in product quality on the shelf occurs and significantly poor quality product is present within the display, sales of broccolini are inhibited.

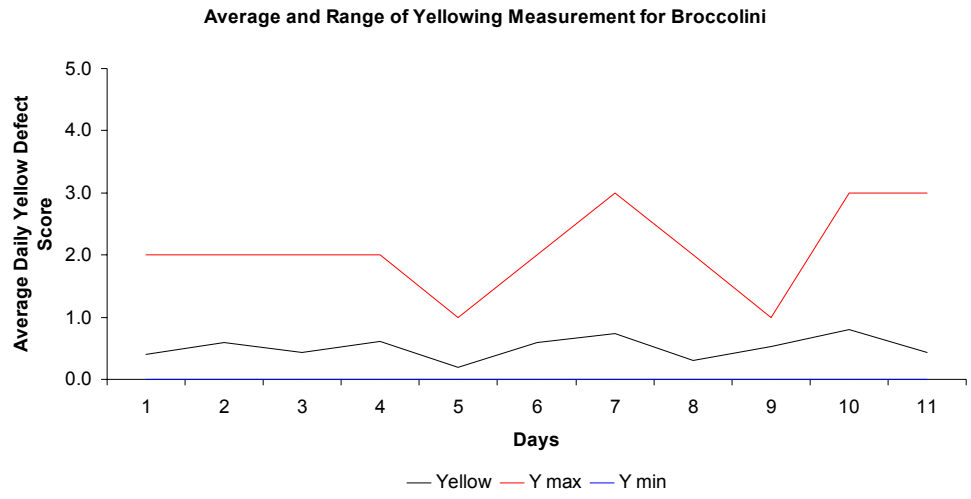


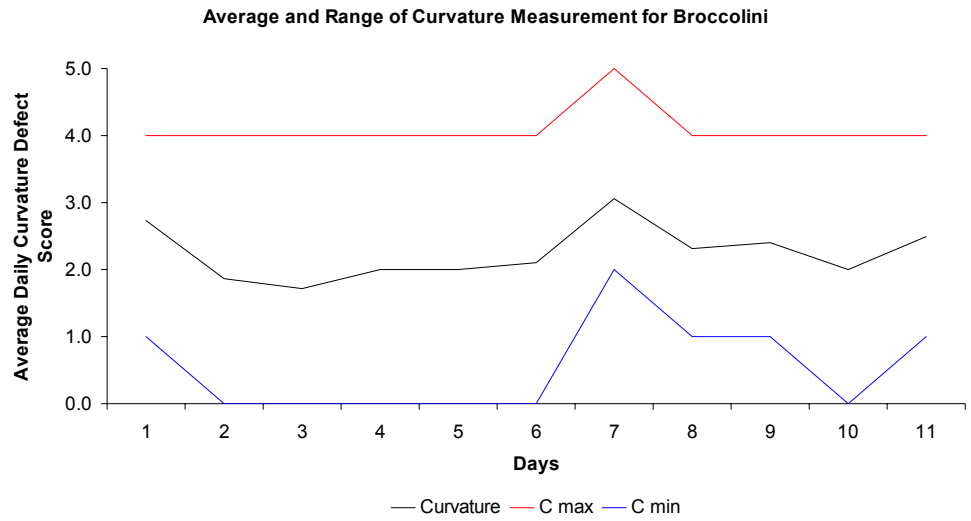
Quality assessment rating systems	
Yellowing 0 - no yellowing present 1 - very minor yellowing (1-5 Broccolini florets showing flower) 2 - slight yellowing (6-10 florets open) 3 - moderate yellowing (11-20 florets); minor chlorosis 4 - significant yellowing; further chlorosis of florets and plant parts 5 - severe yellowing and chlorosis **Curvature of stems** 0 - no curvature 1 - very minor curvature (1-10 degrees) 2 - slight curvature (11-20) 3 - moderate curvature (21-30) 4 - significant curvature (31-40) 5 - severe curvature (>41 degrees)	**Firmness (turgidity - degree of movement of stems)** 0 - virtually no movement of stem end (<2cm movement) 1 - (2-4 cm movement of stem end) 2 - (4-6 cm movement) 3 - (6-8 cm movement) 4 - (8-10 cm movement) 5 - (>10 cm movement) **Blemishes, rots - overall quality** 0 - no blemishing or rots present 1 - very minor blemishing (1-5%) 2 - slight blemishing (6-10%) 3 - moderate blemishing (11-20%) 4 - noticeable blemishing (21-30%) 5 - severe blemishing (>31%) Blue = Possibly unacceptable Red = Not Acceptable

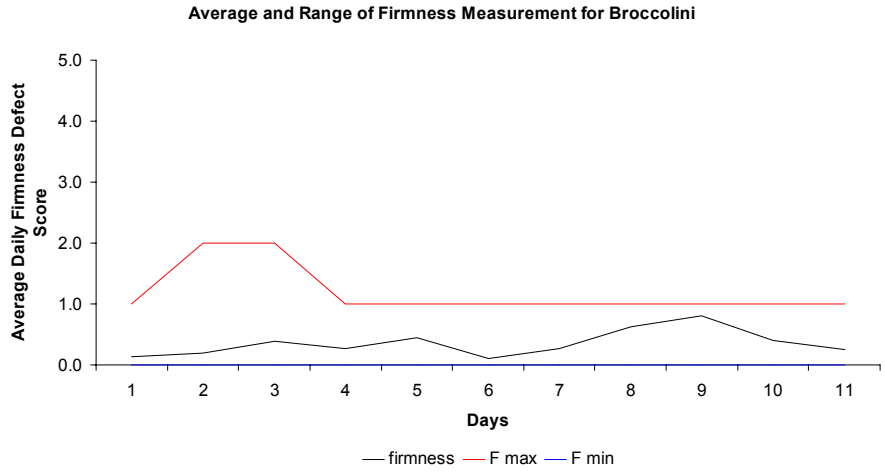
Product Rotation

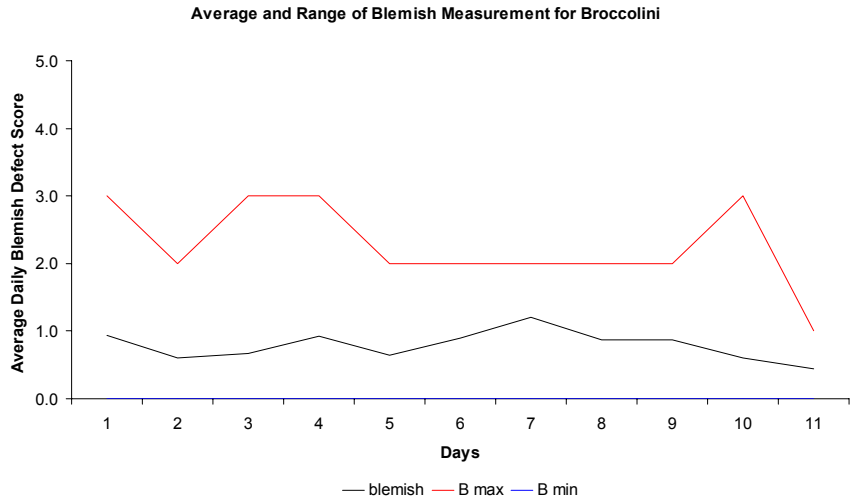
The retention of the Broccolini bunches on the shelf was monitored for one week during Phase 1 in Store 1. Product was recorded daily to give an indication of bunch rotation and the freshness of the shelf display. In general the shelf display of the Broccolini was well stocked and replenished with fresh bunches each day. The turnover of product was high.

During the week of monitoring product rotation, there was generally low variation in the average levels of each of the subjective quality defects but there was a large range in the level for curvature.

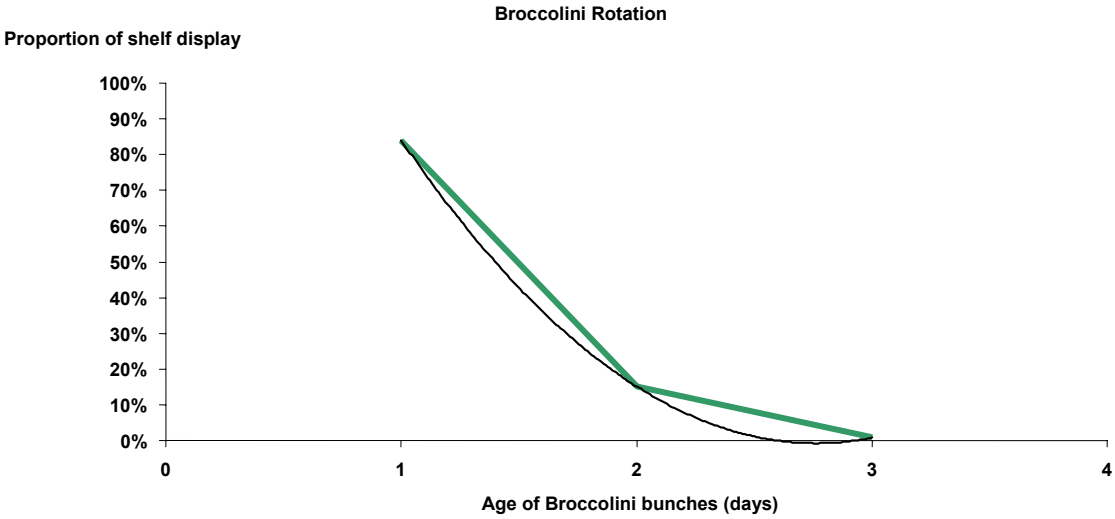




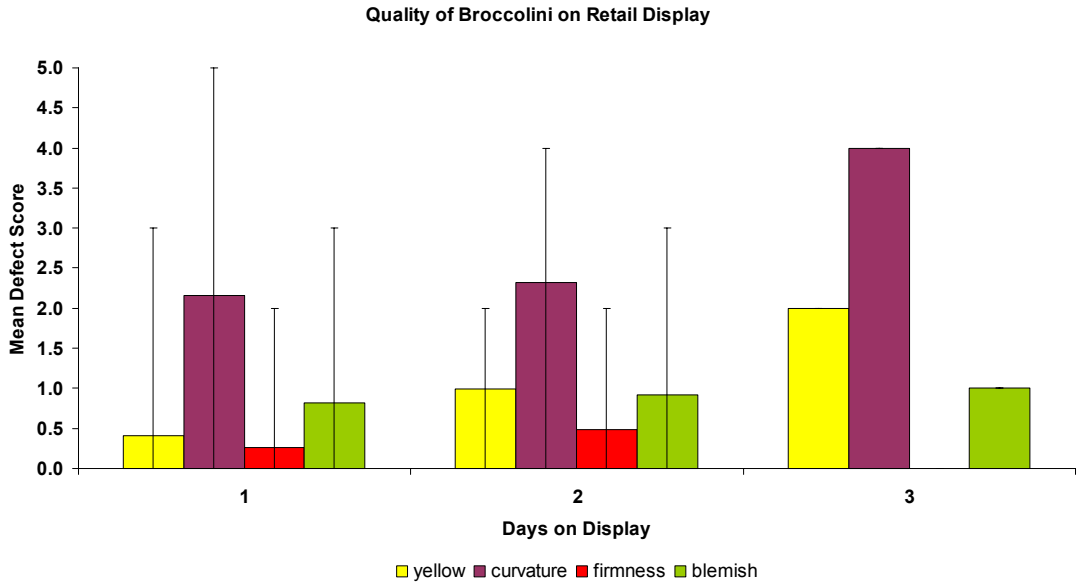




The number of bunches on the shelf at times of monitoring (display size was 30 x 90 cm) did not vary greatly over the monitored period, ranging from 15 to 26 bunches. The Broccolini display consisted mainly of one and two day old bunches, with only 1% being three days old as shown in the figure below which outlines Broccolini Rotation. On the days monitored there were always fresh bunches on display. The Broccolini display was restocked with fresh produce daily which is reinforced by the low average levels of quality defects found during the period of monitoring to examine product rotation (excluding curvature which was high on average).



The average quality of Broccolini bunches on the shelf display for the eleven days of measurement is shown below. Bunches that were on the display for 3 days showed an increase in curvature and yellowing defects.

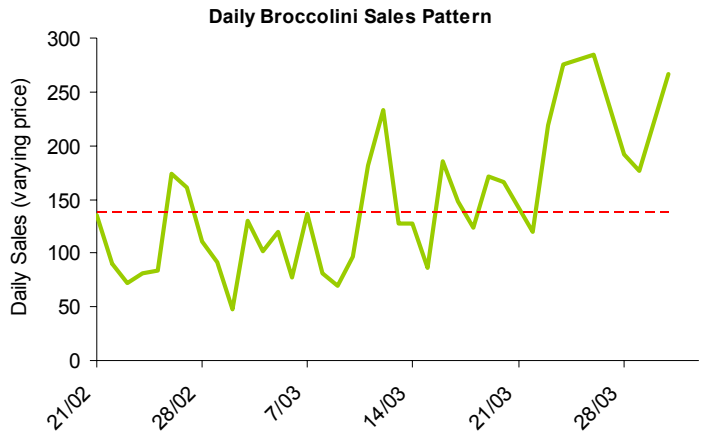


Sales Analysis

The current contribution of broccolini to total sales ($) is low, never exceeding 0.5% of daily sales and varying between 0.1 and 0.5%.

Daily Sales

The Broccolini sales data for phase 2 shows a cyclical pattern with a large variation in sales between days. This is the same pattern as observed in phase 1. All three products (broccolini, asparagus and broccoli) showed high sales on Easter Thursday. Sales on Easter Thursday for broccolini were $275 compared to a daily average of $212 for that week. The in-store demonstrations increased sales on the day, but there was no effect on the following days and there was no evidence of a residual lift in overall sales as a result of the three promotions.



Weekly Sales Summary

Sales of Broccolini, broccoli bunches, asparagus and broccoli

The average weekly sales of the Broccolini, broccoli and asparagus for week 10 (starting on 28/02/05) to week 14 (starting on 28/03/05) - are shown in the following figures (bars are total weekly sales and lines are average weekly price). During the intervention phase the Broccolini sales averaged $917, asparagus $1695 and broccoli $2346. During the benchmarking phase of the trial, the broccoli bunches code was used in the sales data for a second display of broccolini at the front of the store. The broccolini sold under this code was the same price of $2.98. For this report the two shelves of broccolini during the benchmarking phase (both priced at $2.98) have been summed for analysis.

Broccolini

Broccolini sales were nearly 20% higher during the intervention period. Weeks 11 and 12 had increased sales that corresponded to a drop in price from $2.49 to $1.97/bunch. These increased volumes sold were maintained when the price increased to $2.99 during week 13. The changes in the Broccolini price and resulting sales did not consistently affect any of the other products monitored.

Asparagus

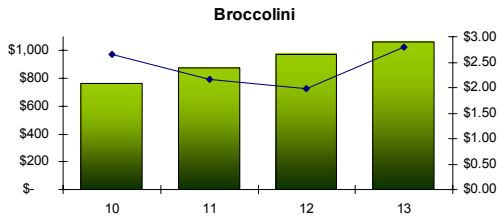
The price of asparagus varied throughout March ($2.00/kg to $3.19/kg) and this affected weekly sales which varied from $1024 to $2890. Overall asparagus sales were half those during the benchmarking phase. The average weekly sales for asparagus fell from $2996 to $1695 between the two periods.

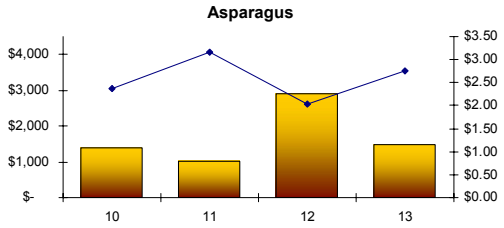
Broccoli

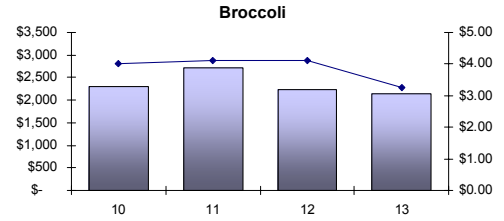
Broccoli sales decreased from phase 1 (weekly average of $2800) to phase 2 (weekly average of $2347). During phase 2 the quantity of broccoli sales varied within a $600 range while the price was fairly constant at $3.99/kg. These variations were similar to those measured during benchmarking.

Broccoli bunches

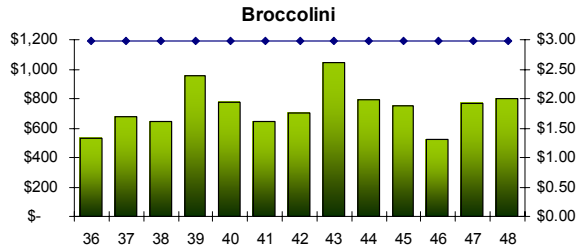
Broccoli bunches were not stocked at this store at any time during the project.

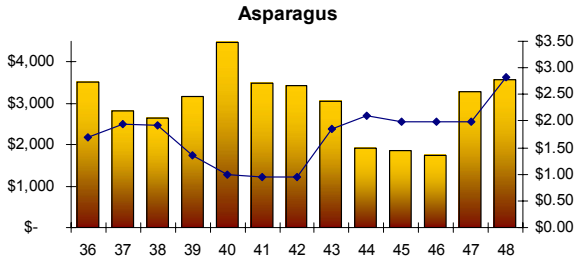


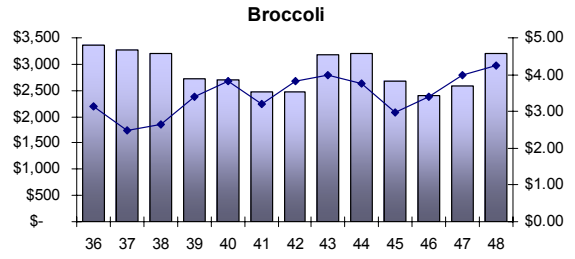




Weekly Sales: Intervention Period (above)



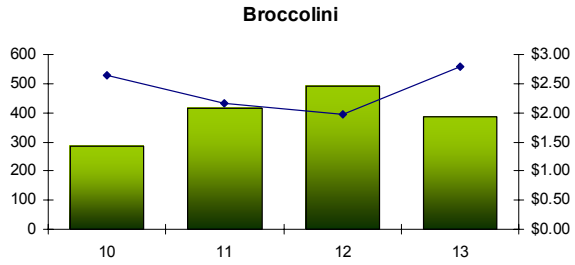


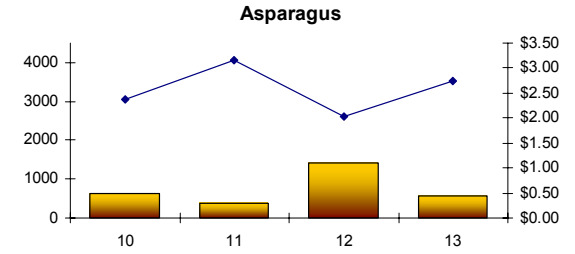


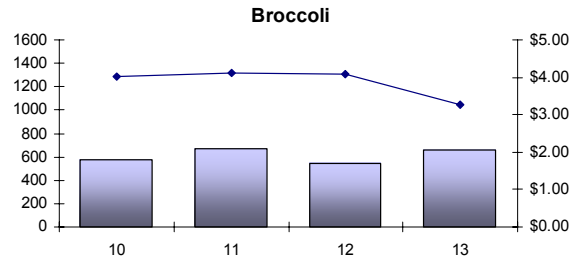
Weekly Sales: Benchmark period (above)

This second set of figures (below) show the total quantity of product sold on a weekly basis for the two periods. The quantity of broccolini bunches sold rose by over 35% between the two periods. Asparagus had decreased significantly and broccoli decreased slightly.

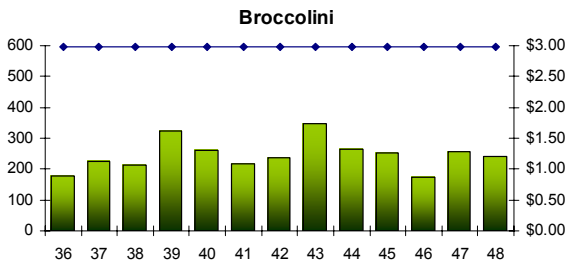
Volume of Sales Intervention Period

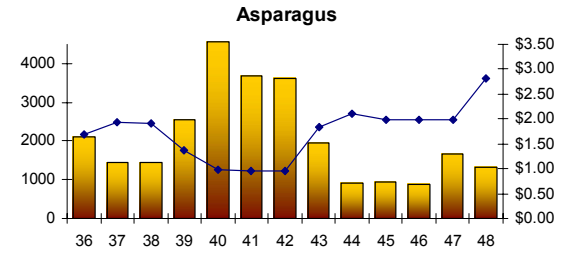


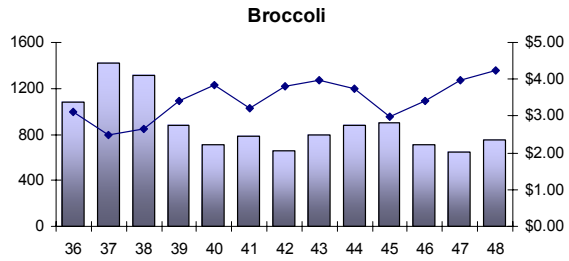




Volume of Sales Benchmarking

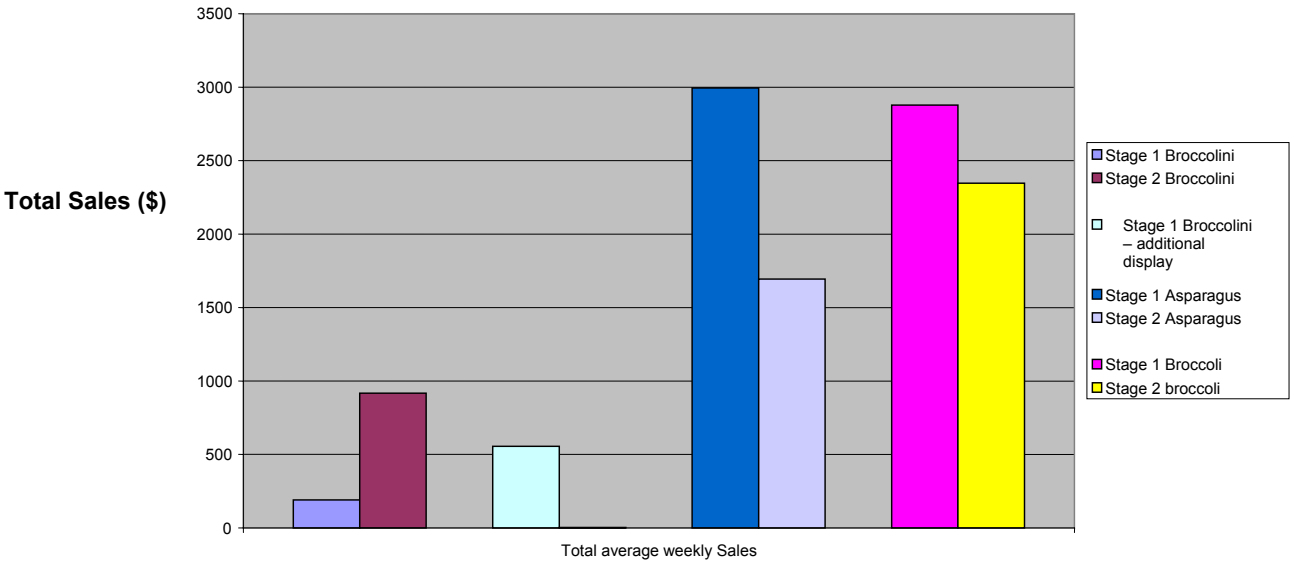






The following figure shows the average weekly sales for broccolini (the figures for both displays that were present during the benchmarking phase are shown separately), asparagus, and broccoli for the two periods. The average weekly sales ($) of broccolini rose significantly between the two periods. Asparagus volumes and sales have decreased significantly and broccoli decreased slightly.

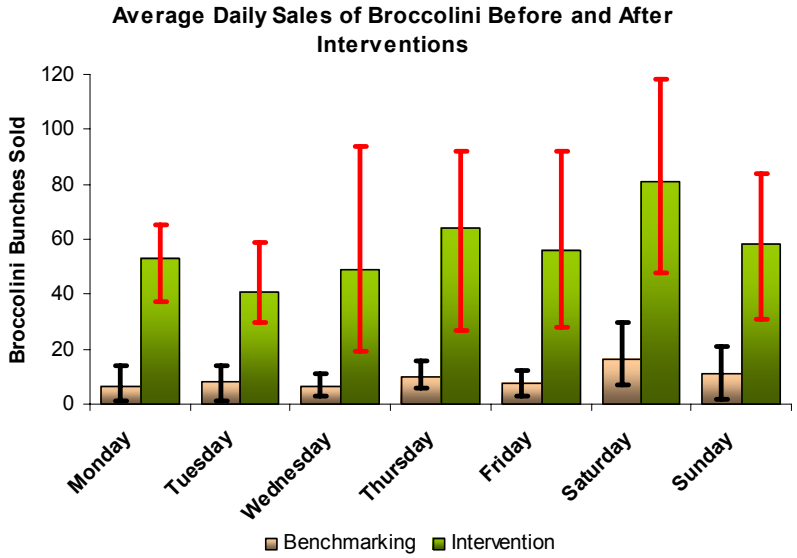
Total average weekly sales ($) for broccolini (2 separate displays), asparagus and broccoli in Store 1 during phase 1 & 2.



Broccolini, broccolini (second display), asparagus, broccoli - phases 1 & 2.

Day of the Week Pattern

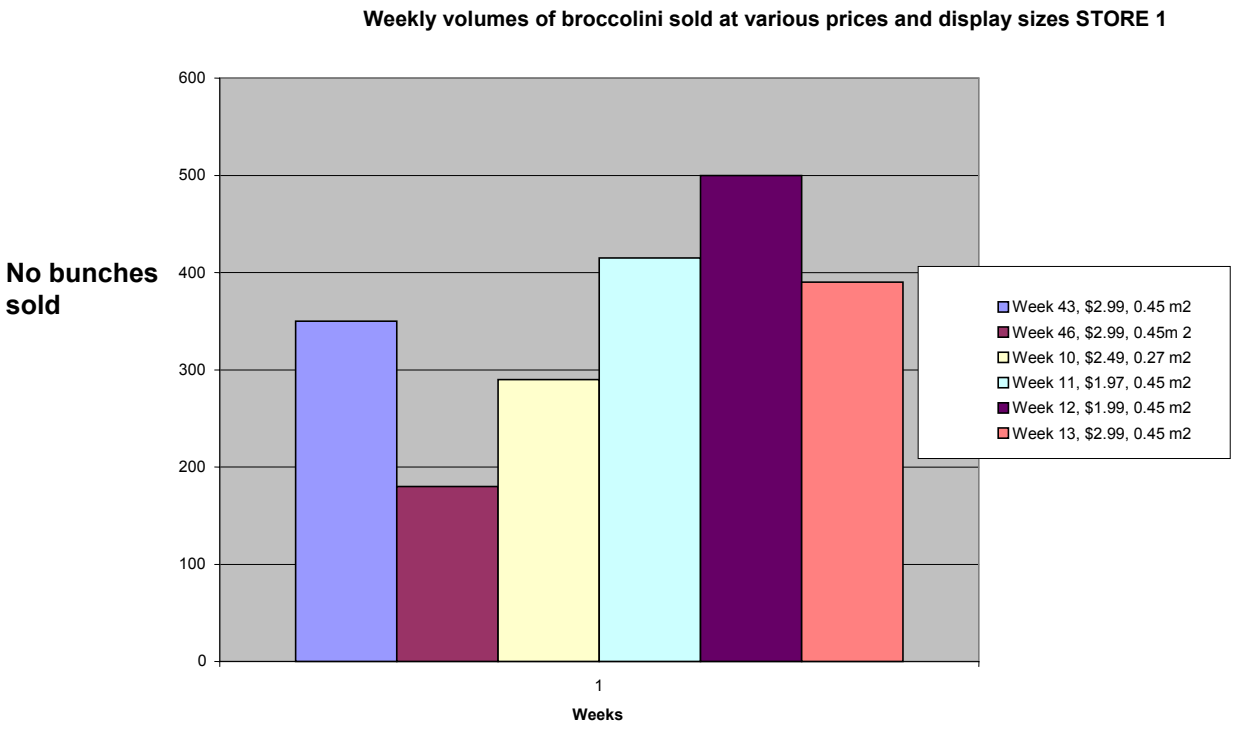
A day of the week sales pattern is apparent for the Broccolini transactions, as seen in the figure below. The pattern is similar for phase 1 (benchmarking) and phase 2 (intervention). Tuesday has the least sales and high sales were recorded for Saturday each week. The range from week to week however, is very high (orange bars). The average and range of sales on Saturdays was also observed to be for the benchmarking period. This pattern is expected for a small turnover product. Easter Thursday showed extremely high sales and was not included in this figure.



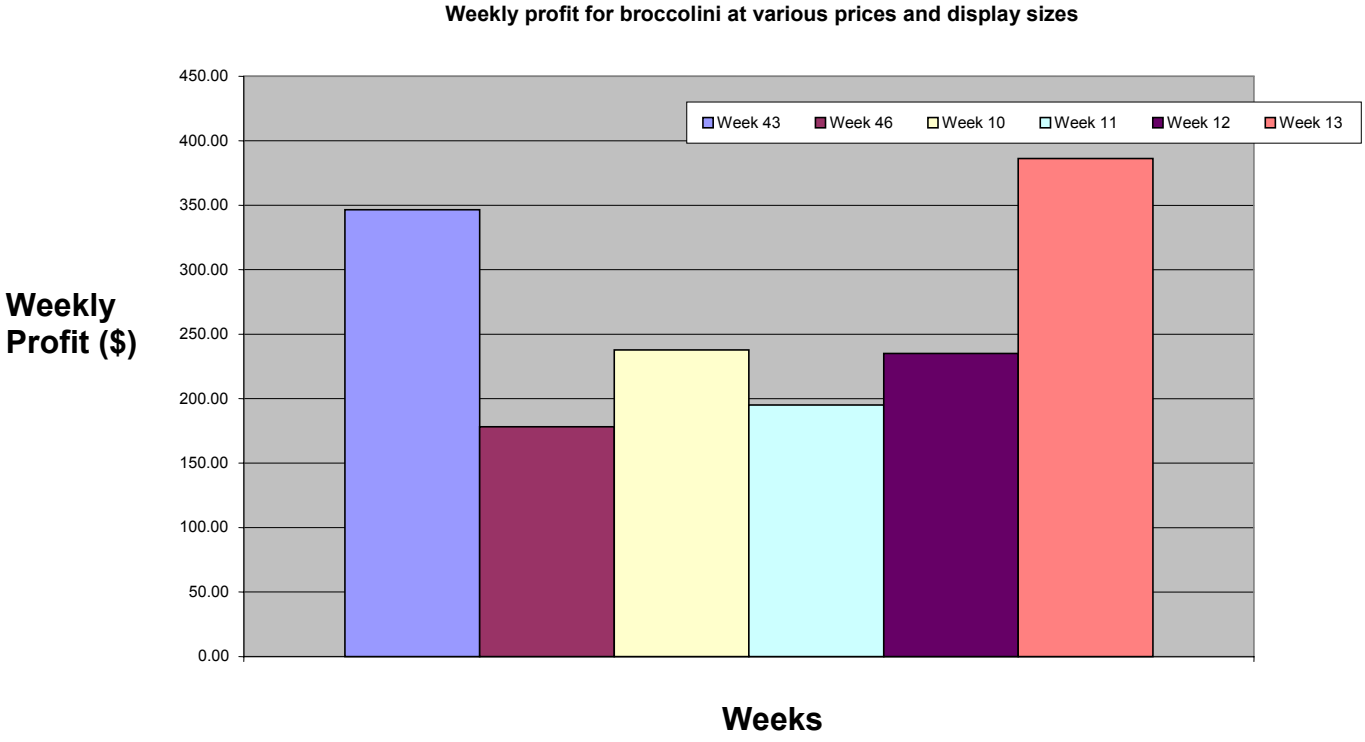
Sales and Profitability of Broccolini during the Project – STORE 1

As previously mentioned, in late 2004 phase 1 data was collected (benchmarking study). Sales and customer activity for that time of the year and situation was established. Then in early 2005 (Weeks 10 to 14, 28/02/05 to 03/04/05) -during phase 2 - the following interventions were made:

- The price was lowered from $2.99 to $2.49 for five days in Week 10 and then lowered again to $1.97 for Week 11 and most of Week 12 then rose back to $2.99 around Easter.
- The store's signage was added to the display to alert customers to the special price.
- In-store promotions were carried out on three occasions.
- The shelf size was increased in Week 11 (Tuesday 8th March) from 30 x 90cm to 50 x 90cm. This size increase coincided with a price change.

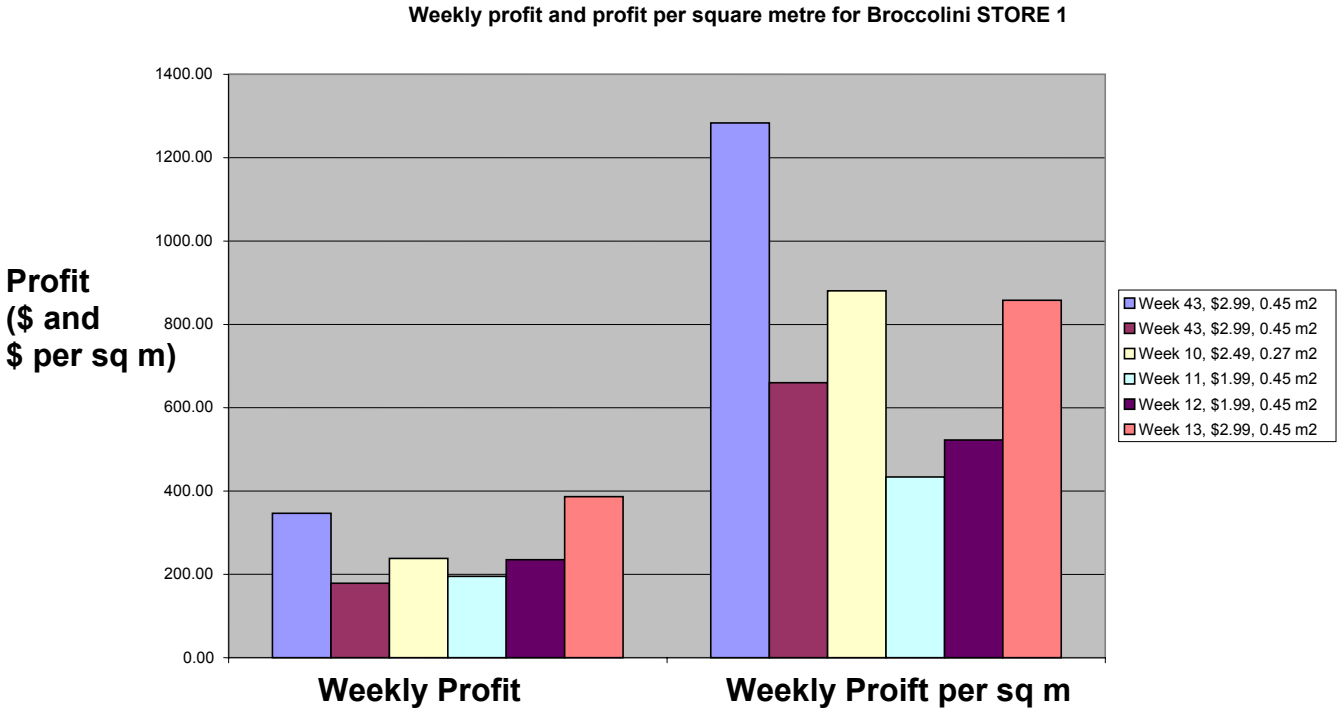


The highest number of bunches sold in any one week during the 2 monitoring phases was in week 12 when the sale price was $1.99 per bunch and the display size was 0.45 sq m. Sales in the 4 weeks of phase 2 (intervention) were higher than the lowest weekly volumes recorded during phase 1 (benchmarking).



The highest and lowest weekly profit for broccolini was in a similar range for phases 1 and 2. It is interesting to note that highest weekly profit was in week 13 (Easter week) closely followed by week 43 (phase 1) and weeks 46, 10, 11 and 12 showed profit of between $180 and $250.

The profit per square metre is closely related to the size of the display and the GP%. Profit per square metre is high during phase 1 and phase 2. The highest weekly profits per square metre were recorded in weeks 43, 10 and 13. In this store the size of the display and the use of 2 display sites during phase 1 may have positively influenced sales.



In-store Component of the Project

Store 2

Background

In late 2004, phase 1 (known as the benchmarking study) was carried out to establish current sales and customer activity for that time of year and situation. Then in early 2005 during phase 2, (weeks 10 to 14, 28/02/05 to 03/04/05) the following interventions were made:

- Broccolini display was relocated from the front of the store to the vegetable section where it had originally been before the start of phase 1.
- The retail price was $2.99 for 1 week (week 10) then reduced to $1.97 for Weeks 11, 12 and part of Week 13 and then increased to $3.49 after Easter.
- Special store signage was added to the display to alert customers to the special price.
- In-store promotions were carried out on three occasions.
- The size of the display was doubled in Week 11.

Three independent stores were involved in the project. This section outlines information related to Store 2. The data capture tools used in the store were the interactive shelf (load cell), image analysis of customers' movements, in-store quality assessments and analyses of the transaction data.

Conversion Rates

The conversion rates were determined using the image processing equipment. Primarily this measured the total traffic past the Broccolini which includes all staff and customer movement and is dependent on the size of the 'zones' (ie mask, interest and item) that are set up in the image processing analysis. To some degree, the system also measures the number of people who stop and look at the Broccolini. This measurement has some limitations due to the very narrow display used, slight movement of the position of broccolini display each time displays are redone, and the effect of any changes in the products displayed around and beside the broccolini. It is not possible to be certain that customers have paused specifically to look at the broccolini.

Broccolini Exposure

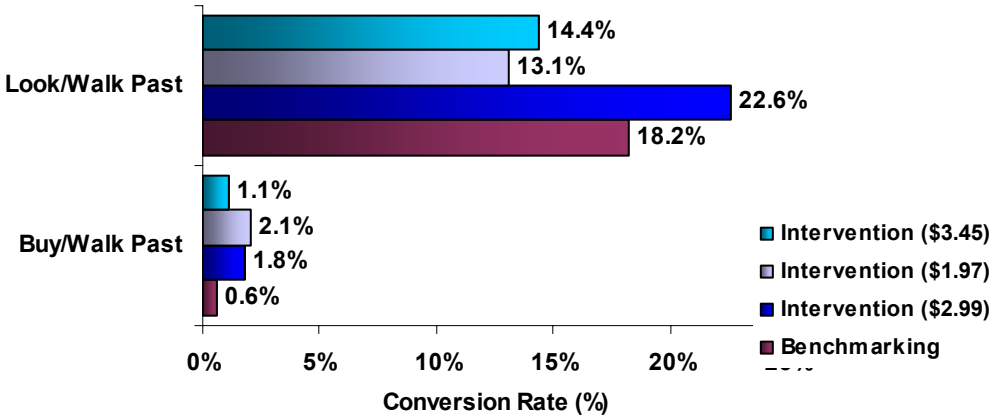
The location of the display in this store was changed between the two periods so that the interactive shelf (load cell) could be used. During benchmarking the camera was located near the entrance and was recording an average of two passes per customer at the shelf (customers collecting baskets, returning more than once to this area of the store, etc). For the intervention phase a new shelf was installed in the vegetable area, and the camera only recorded an average of one pass per customer. Approximately half the total customers in the store were passing the display.

Average Conversion Rates

The average conversion rates are shown below. During phase 1 (benchmarking period) over 18% of customers stopped in the close vicinity of the broccolini display. Nearly 0.6% of those who walked past converted into a purchase. When the broccolini display was moved back to the vegetable area, 22.6% stopped in close vicinity of the broccolini display. During phase 2 (intervention phase), there was also an increased conversion of walk past/buy to 1.8%. The Broccolini price had also dropped $0.50/bunch (from $3.45 to $2.99/bunch) at the same time.

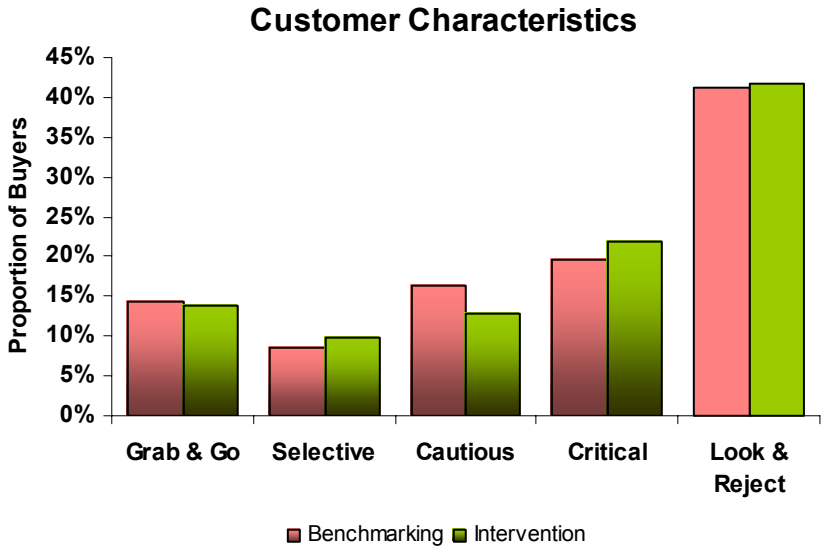
When the price was further lowered to $1.97 for nearly three weeks, the look/walk past conversion slowly fell away to an average of the period of 13.1%. The change could also be

associated with a change in the products surrounding the broccolini display. This information could also suggest that the consumers were becoming used to the new display and, perhaps the price. Conversion of buy/walk past was higher at 2.1%. Once the price was raised a similar proportion of the population still stopped in close vicinity of the broccolini display, but the conversion of buy/walk past dropped away – possibly due to the higher price. The changes in price and display size during phase 2 (intervention phase) converted a proportion of those who had stopped in the close vicinity of the product into purchasing when the price was lower.



Customer-Product Interaction

This analysis is based on the measurements made with the interactive shelf technology (load cell placed under display to measure changes in weight of the display). The figure below shows the average interaction behaviours between customers and the Broccolini for phase 1 and phase 2.



Overall the proportion of buyers who fell into the five customer character types stayed approximately constant between the benchmarking and intervention phases. There was a reasonably high proportion of the purchasing population who were confident with the product (grab & go customers). A large proportion of buyers spent some time over making their purchase decision (critical 20%). There was also 40 – 45% of customers who interacted with the product but then put it back (Look & Reject). This proportion of the population also stayed constant between the two monitored periods. Effectively four out of every ten customers who handled the brcoolini elected not to buy the Broccolini.

The population behaviour profile for a product generally changes according to the price and quality of the product. For example, if the quality is poor customers will generally spend more time selecting their purchase and/or the Look & Reject percentage is high. Likewise if the price is perceived as high customers generally take more time to make their selection. In this case the price was dropped and yet customer behaviour remained the same. This may suggest that a number of customers have a poor understanding of the product since their selection behaviour at the shelf did not shift towards more Grab and Go as might be expected.

Product Quality

The Broccolini quality was measured using the scoring system shown below. Quality was generally of a slightly better standard during phase 2 (intervention period) than the quality recorded during phase 1 (benchmarking). However the quality did show an increased range, varying from excellent (0 score for defects) to unacceptable (5 score for defects) during the five days that the quality was checked (1st, 7th, 11th, 14th and 18th March 2005).

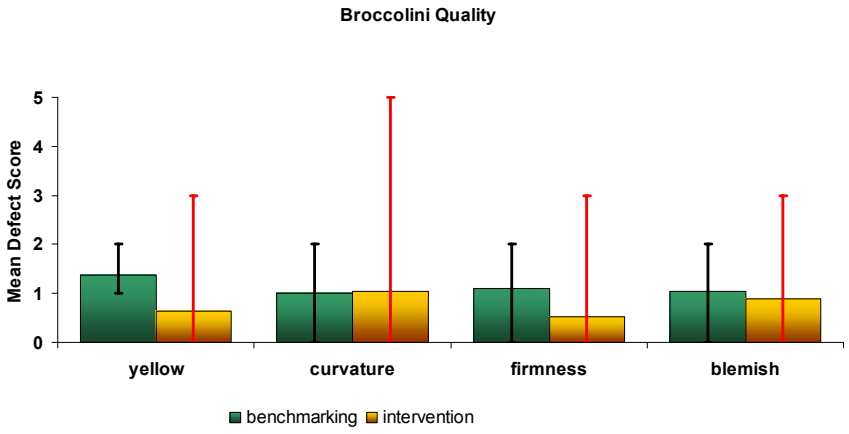
It is important to note that the average yellowing, curvature, firmness and blemishes on average were all ratings of better than 2 but that the range included some significantly poor quality product in terms of all 4 quality parameters within the displays.

This needs to be considered in light of the consumer survey results. Most of the survey participants indicated that the quality of broccolini was the most important factor in their decision to buy.

Within quality:

- Most rated colour and firmness of broccolini stems as important to overall broccolini quality.
- 69% rated the amount of yellow flowers as important.
- Other quality attributes such as stem straightness, length and numbers within a bunch were not considered important.
- 47% of those surveyed indicated that they were still prepared to buy stems that were severely bent.
- Only 9% of those surveyed were prepared to buy broccolini bunches with severe stem damage or high numbers of flowering heads.

It is highly likely that when the extreme defect score (porest quality) broccolini is on the shelf sales of broccolini are inhibited.



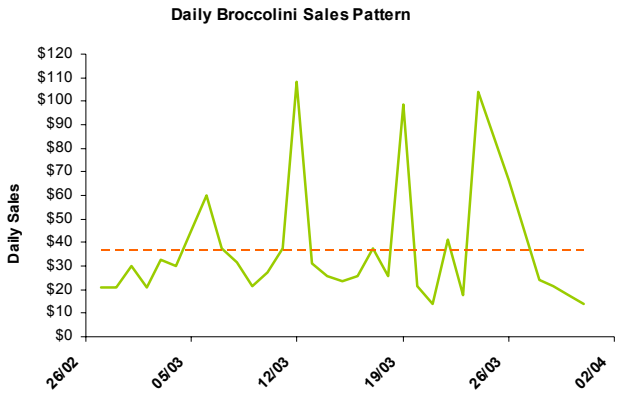
Quality assessment rating systems	
Yellowing 0 - no yellowing present 1 - very minor yellowing (1-5 Broccolini florets showing flower) 2 - slight yellowing (6-10 florets open) 3 - moderate yellowing (11-20 florets); minor chlorosis 4 - significant yellowing; further chlorosis of florets and plant parts 5 - severe yellowing and chlorosis **Curvature of stems** 0 - no curvature 1 - very minor curvature (1-10 degrees) 2 - slight curvature (11-20) 3 - moderate curvature (21-30) 4 - significant curvature (31-40) 5 - severe curvature (>41 degrees)	**Firmness (turgidity - degree of movement of stems)** 0 - virtually no movement of stem end (<2cm movement) 1 - (2-4 cm movement of stem end) 2 - (4-6 cm movement) 3 - (6-8 cm movement) 4 - (8-10 cm movement) 5 - (>10 cm movement) **Blemishes, rots - overall quality** 0 - no blemishing or rots present 1 - very minor blemishing (1-5%) 2 - slight blemishing (6-10%) 3 - moderate blemishing (11-20%) 4 - noticeable blemishing (21-30%) 5 - severe blemishing (>31%) Blue = Possibly unacceptable Red = Not Acceptable

Sales Analysis

Daily Sales

Analysis of the transaction data showed that the total store average daily sales were very similar between the benchmarking and intervention phases of the project (intervention phase was higher by only 1.2%).

During phase 2, the broccolini sales data show a cyclical pattern with a large variation in sales between days. This is the same pattern as observed in phase 1 (benchmarking phase) and is typical of smaller lines. Broccolini, asparagus and broccoli showed very high sales on the Easter Thursday. Broccolini sales on Easter Thursday were $104 compared to a daily average of $49 for that week. The in-store demonstrations increased sales on the day of the promotion, but there was no effect on the following days and there was no evidence of a residual lift in overall sales as a result of the three promotions.

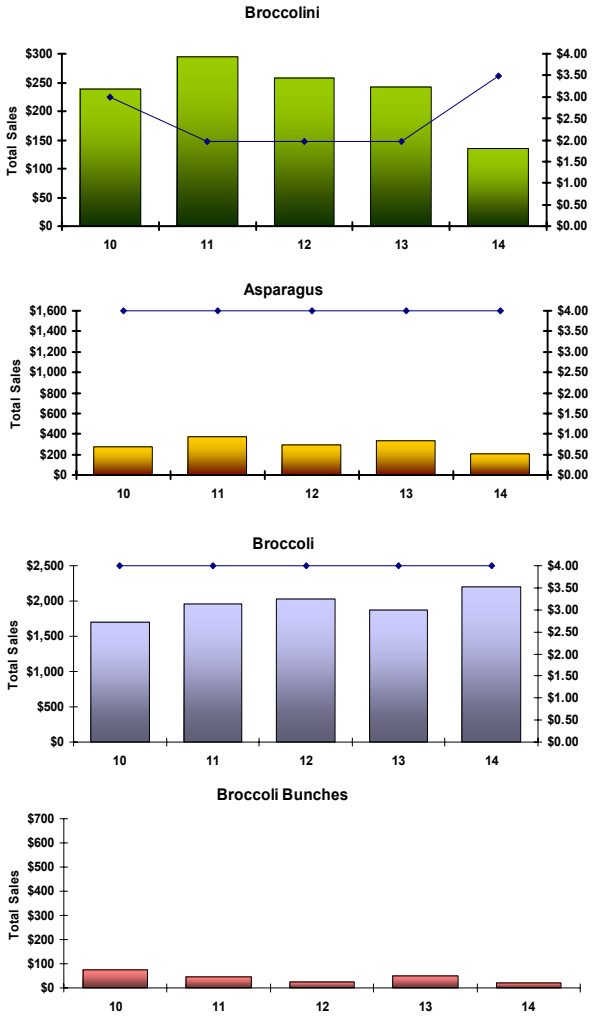


Weekly Sales Summary

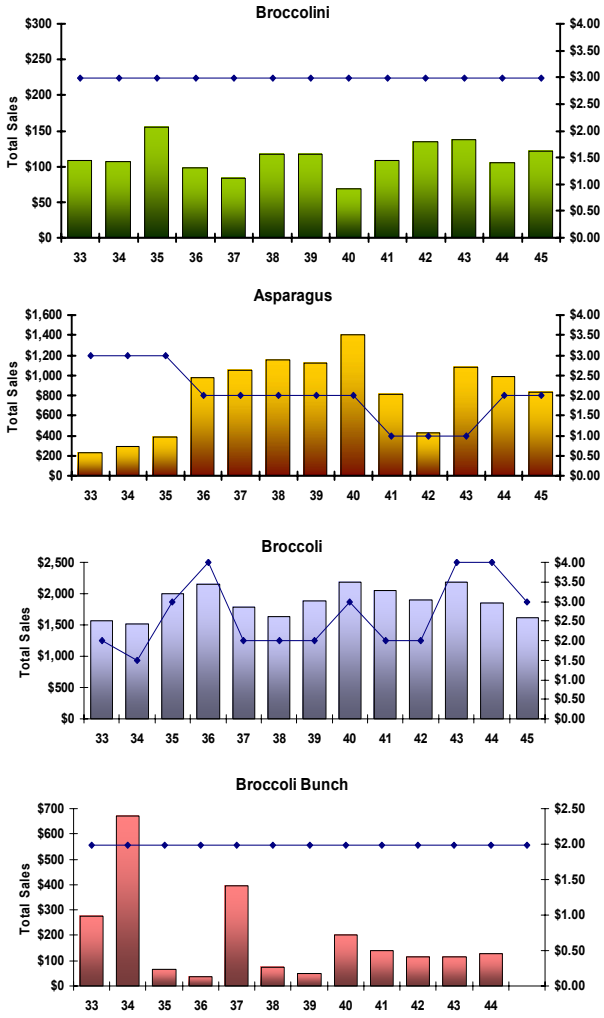
During phase 2, the contribution of broccolini to total sales ($) in Store 2 store was low, never exceeding 0.5% of daily sales and varying between 0.1% and 0.5%. This was however, nearly twice as high as was recorded in phase 1 (benchmarking period).

The average weekly sales of the Broccolini, broccoli, broccoli bunches and asparagus for week 10 (starting on 28/02/05) to week 14 (starting on 28/03/05) - are shown in the following figures (bars are total weekly sales and lines are average weekly retail price). During phase 2, broccolini sales averaged $219, asparagus $325 and broccoli $1960. Broccoli bunches had a very limited supply during phase 2 (intervention phase) in March 2005 with sales only averaging $47 compared to $180 per week in phase 1 (benchmarking period).

Weekly Sales Intervention Phase



Weekly Sales Benchmark



Broccolini

Week 11 displayed an increase in sales that corresponded to a drop in price from $2.99 to $1.97/bunch. However these increased sales were not as high over the following two weeks at the same special price. There was a marked drop in sales when the price increased to $3.49 during week 14. During phase 2, the changes in the broccolini price and display size and the increased sales did not appear to affect any of the other products monitored.

Asparagus

The price of asparagus remained constant throughout March ($3.99/kg) but weekly sales showed variation between $210 and $390. Overall asparagus sales were half those during the benchmarking phase. The average daily sales for asparagus fell from $121 per day to $46 between the two periods.

Broccoli

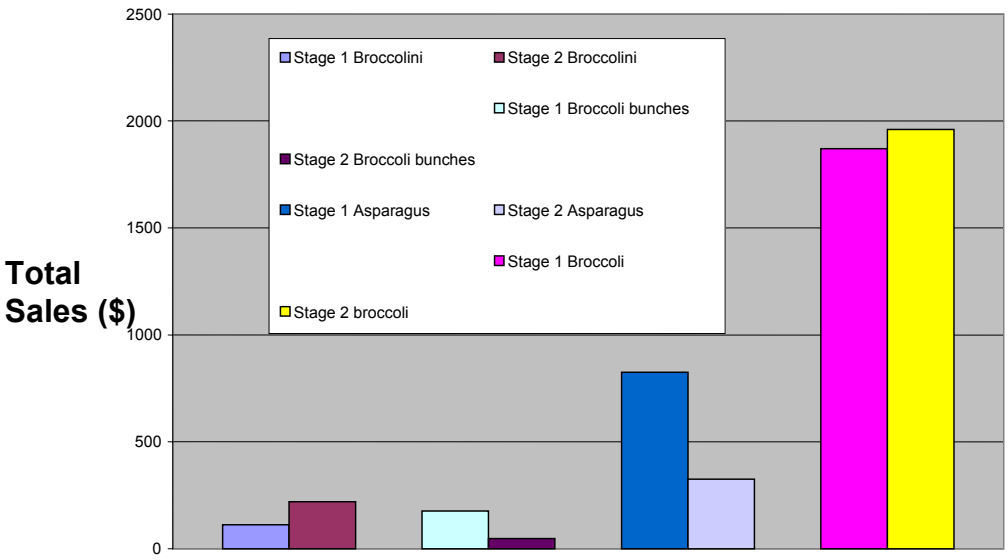
Broccoli sales did increase slightly from the benchmarking period with a daily average of $294 compared to $270 earlier. The quantity of broccoli sales varied within a $500 range while the price was constant at $3.99/kg. These variations were similar to those measured during benchmarking and did not match movements in Broccolini sales.

Broccoli bunches

There was a limited supply of broccoli bunches during the intervention phase compared to the benchmarking period. Broccoli bunches showed a drop in average daily sales of $20 per day from $29 to $9.

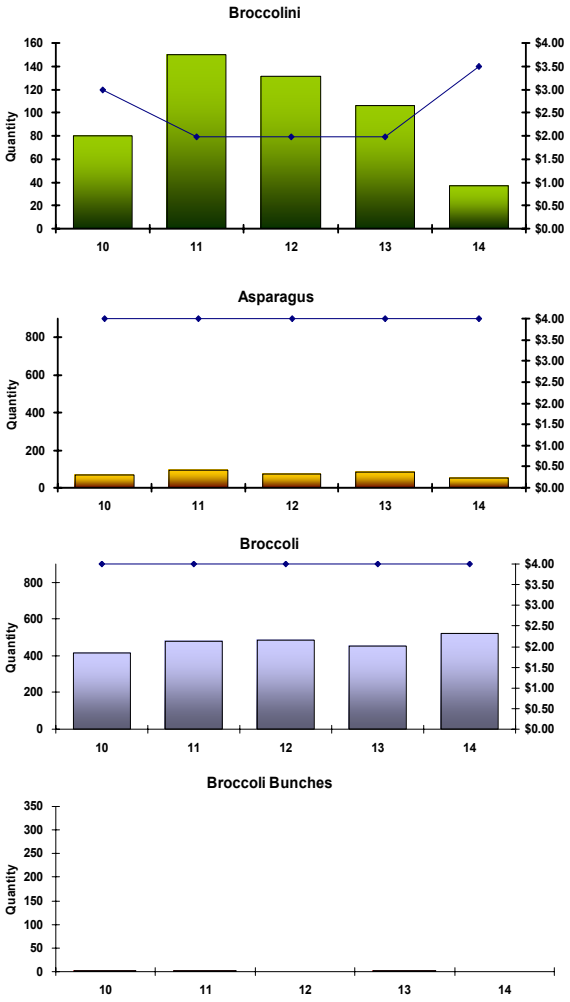
This second set of figures (below) show the total quantity of product sold on a weekly basis for the two periods. The quantity of Broccolini bunches sold has risen dramatically between the two periods. Also, asparagus has decreased significantly and broccoli decreased slightly.

Total average weekly sales ($) for broccolini, broccoli bunches, asparagus and broccoli in Store 2 during phase 1 & 2.

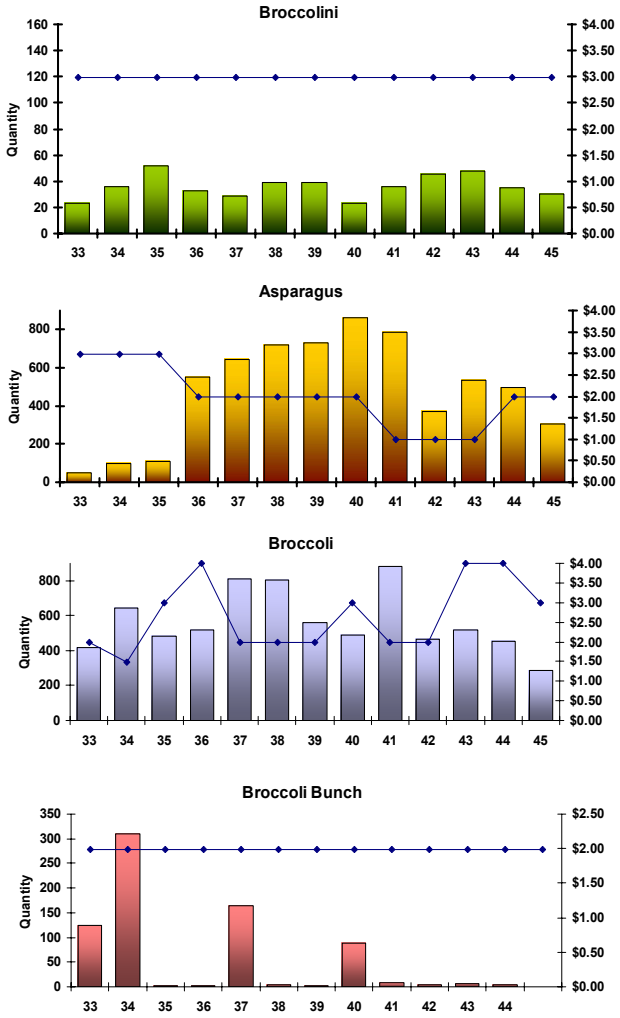


Broccolini, broccoli bunches, asparagus, broccoli - phases 1 & 2.

Volume of Sales Intervention Phase



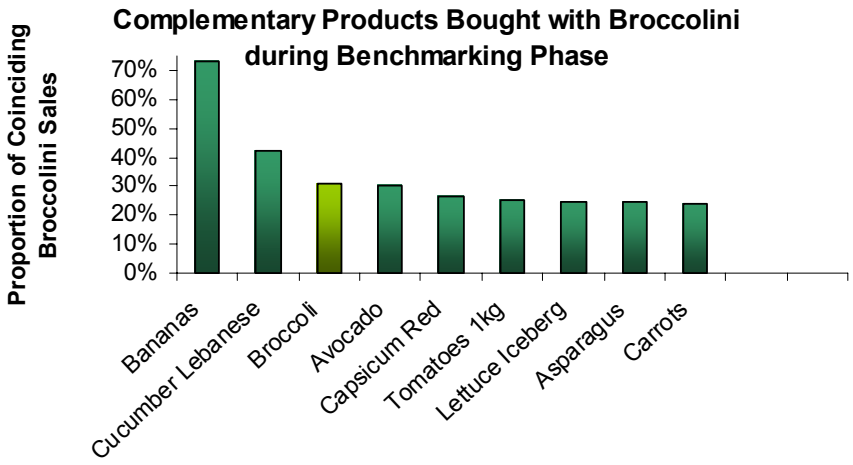
Volume of Sales Benchmarking

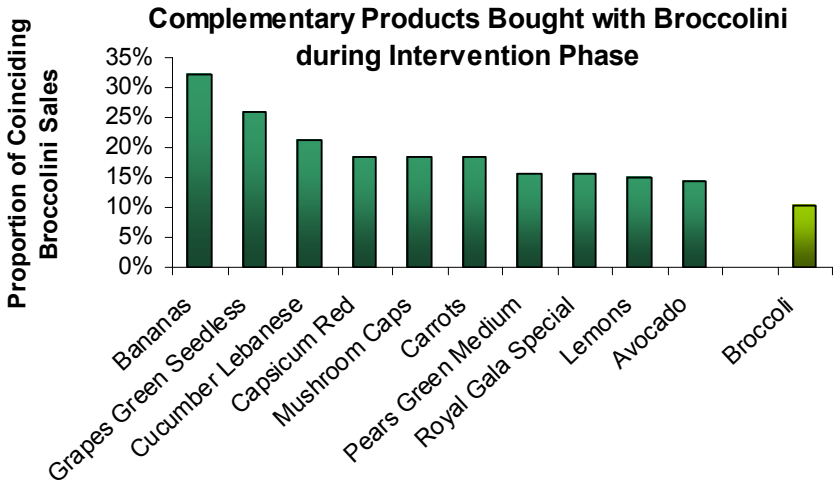


Complementary Product Buying

An analysis of products commonly bought with broccolini is shown below. Broccolini were most commonly bought with bananas which is the highest selling product in the store. Both asparagus and broccoli were within the ten most commonly bought products in association with broccolini during the benchmarking phase. Broccoli bunches were not in the list of other products most commonly bought with broccolini during phase 1 when broccoli bunch sales were much higher than broccolini sales. The data shows that 30% of transactions occur where broccoli and broccolini are purchased together and nearly 30 % of transactions occur where asparagus and broccolini are purchased together.

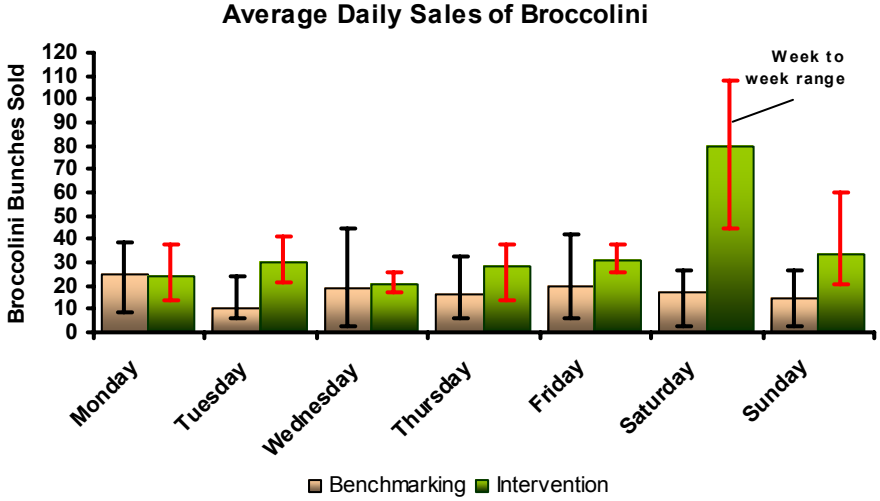
During the phase 2 (intervention phase), the number of purchases of broccoli associated with a broccolini purchase dropping by more than 50% from 30 % of transactions to 15%. Asparagus was no longer in the list of products brought with broccolini during phase 2.





Day of the Week Pattern

A day of the week sales pattern is apparent for broccolini transactions, as seen in the figure below. For phase 2, (intervention period), Monday and Wednesday had the least sales and high sales were recorded for Saturday each week. The range from week to week is very high (orange bars) and the Saturday sales are influenced by the in-store promotions. This is near opposite to the pattern observed in 2004 data. It was noted that the previous pattern seen in Store 2 was atypical (the display was however separate from the vegetable section). Phase 2 data (March 2005) is much closer to what would be expected for a small turnover product. Easter Thursday showed extremely high sales ($104) - and is not shown in the figure below.



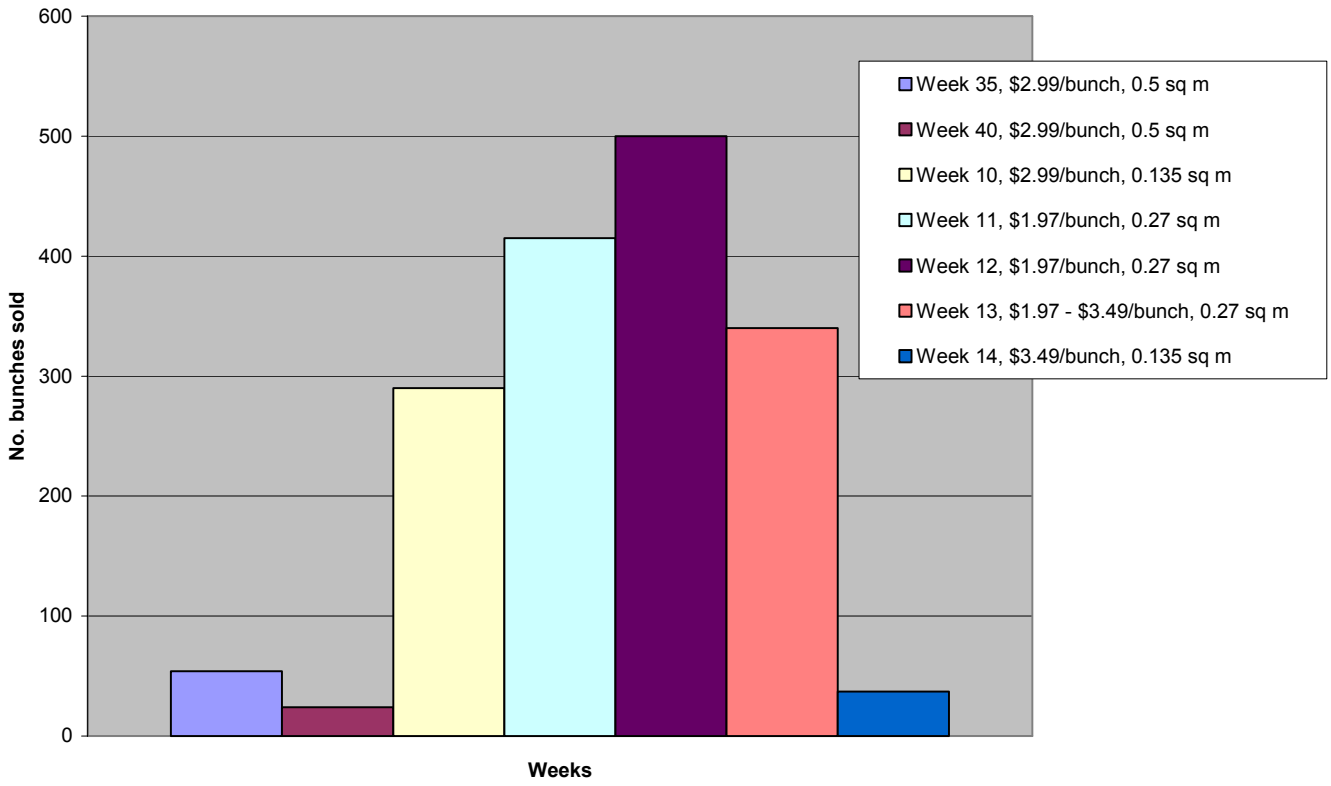
Sales and Profitability of Broccolini during the Project

As outlined previously, in late 2004 phase 1 data was collected (benchmarking study). Sales and customer activity for that time of the year and situation was established. Then in early 2005 (Weeks 10 to 14, 28/02/05 to 03/04/05) -during phase 2 - the following interventions were made:

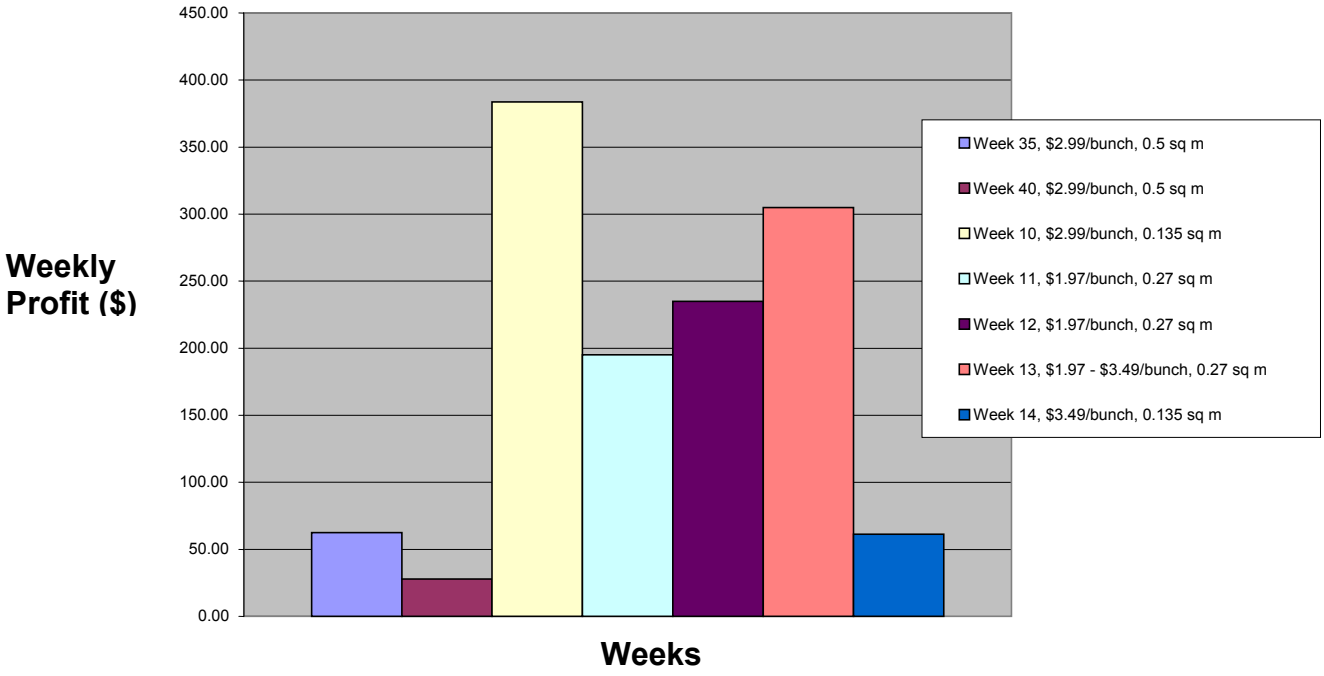
- Broccolini display was relocated from the front of the store to the vegetable section where it had originally been before the start of phase 1.
- The retail price was $2.99 during week 10 then reduced to $1.97 for Weeks 11, 12 and part of Week 13 and then increased to $3.49 after Easter.
- Special store signage was added to the display to alert customers to the special price.
- In-store promotions were carried out on three occasions.
- The size of the display was doubled in Week 11 (increased from 30 x 45 cm to 30 x 90 cm).
- At the onset of phase 2 (intervention phase) broccolini occupied half of a 30 x 90cm display (with asparagus in the other half).
- On Monday 7th March the asparagus was moved and broccolini occupied the 30 x 90 cm area - effectively 16 to 20 bunches, instead of 8 to 10.

The highest number of bunches sold in any one week during the 2 monitoring phases was in week 12 when the sale price was $1.97 per bunch and the display size was 0.27 sq m. Sales in all weeks of phase 2 (intervention) were markedly higher than the lowest and highest weekly volumes recorded during phase 1 (benchmarking) except for week 14 when the price was $3.49/bunch.

Weekly volumes of broccolini sold at various prices and display sizes - Store 2

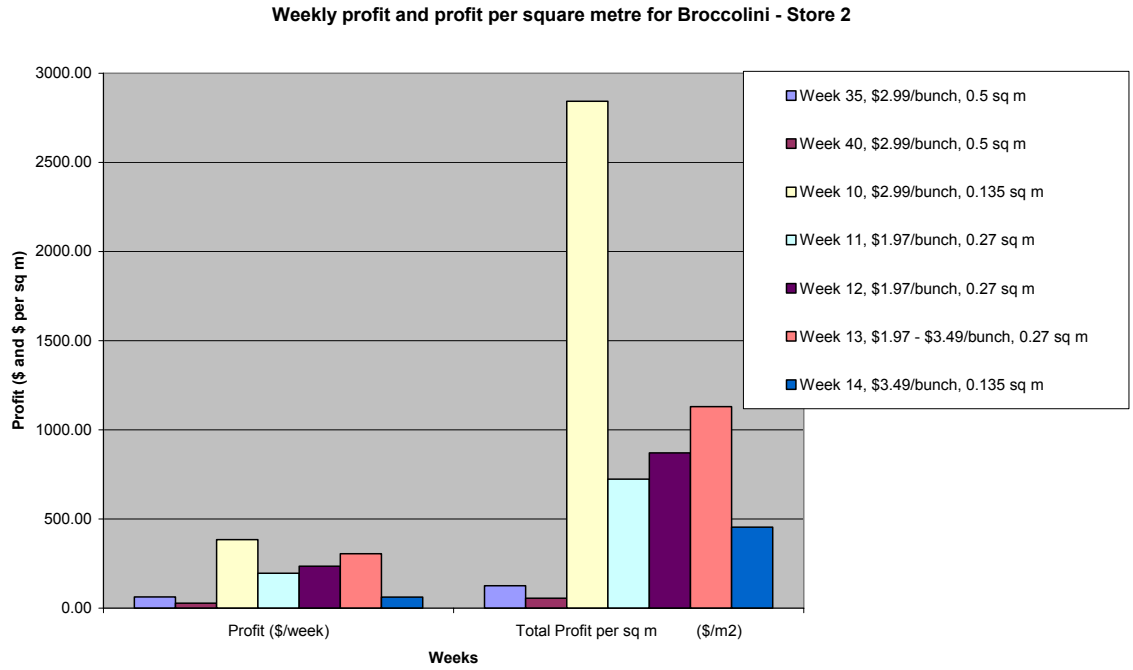


Weekly profit for broccolini at various retail prices and display sizes _ Store 2



The weekly profit for broccolini was higher in all weeks of phase 2 (except for week 14 where price was $3.49/bunch and sales were much lower) compared to the highest and lowest weekly profits in phase 1. It is interesting to note that highest profit was in week 10 and week 13 (Easter week) and weeks 11 and 12 showed profit of between $190 and $240 compared to phase 1 and week 14 where the highest and lowest weekly profits were $62 and $28 respectively.

The profit per square metre is directly related to the volumes sold, the size of the display and the GP%. Profit per square metre is markedly higher in all weeks of phase 2 (except for week 14) compared to phase 1. The highest weekly profit per square metre was recorded in week 10 in Store 2.



- The effects of the larger shelf could not be split out as a price change was made at the same time, however once prices returned to $3.45 the sales levels were similar to the benchmarking period which had a smaller display. This would suggest for the range of display sizes used there was not dramatic effect on sales.

Effect of Price Changes

Once the price of Broccolini was returned to $3.49 the quantity sold returned to similar levels to those during the benchmarking phase. The sales data suggests that customers are sensitive to the Broccolini price, as sales dropped when the price increased.

In-store Component of the Project

Store 3

Background

In late 2004, phase 1 (known as the benchmarking study) was carried out to establish current sales and customer activity for that time of the year and situation. Then in early 2005 during phase 2, (Weeks 10 to 13, 28/02/05 to 27/03/05) the following interventions were made:

- The price was lowered from over $2.50 to $2.29 for nine days starting in Week 11 and then rose back to $2.99 by Week 13.
- The store's signage was added to the display to alert customers to the special price.
- In-store promotions were carried out on three occasions.
- Display size was doubled for Week 11 and then reduced back to its original size from Week 12 onwards.

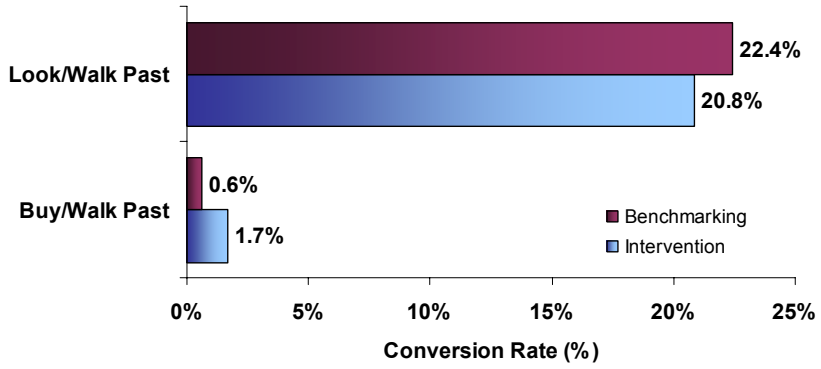
Three independent stores were involved in the project. This report summarises data collected in Store 3 during the study into customer responses to broccolini. The data collection tools used in Store 3 were the image analysis of buyer movements near the broccolini, analysis of transaction data, product rotation and quality measurements.

Conversion Rates

The conversion rates were determined using the image processing equipment. Primarily this measured the total traffic past the Broccolini which includes all staff and customer movement and is dependent on the size of the 'zones' (ie mask, interest and item) that are designated in the image processing analysis. To some degree, the system also measures the number of people who stop and look at the Broccolini. This measurement has some limitations due to the very narrow display used, slight movement of the position of broccolini display each time displays are redone, and the effect of any changes in the products displayed around and beside the broccolini. It is not possible to be certain that customers have paused specifically to look at the broccolini.

Average Conversion Rates

The average conversion rates are shown below. Approximately one in five customers stopped in the close vicinity of the broccolini display. This is similar between phase1 (benchmarking) and phase 2 (intervention). However, the number of people who walk past and convert to a purchase has increased from 0.6% in phase 1 to 1.7% during phase 2.

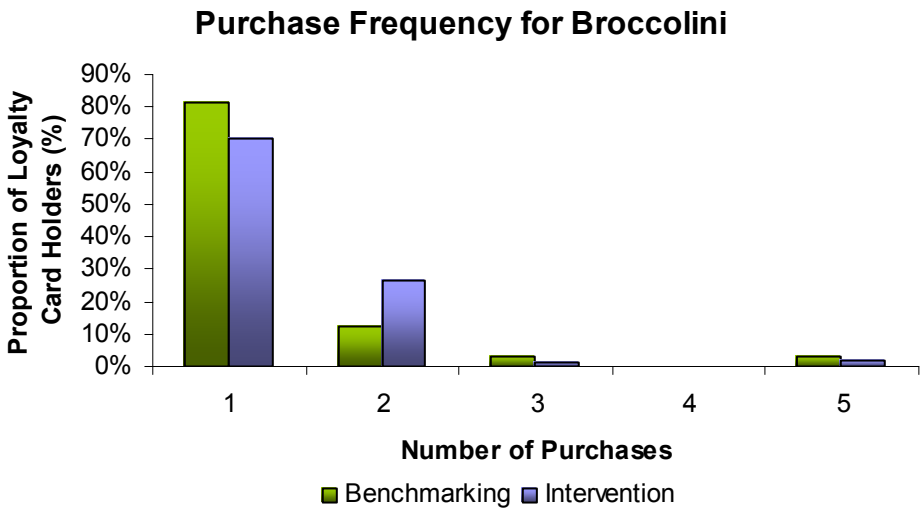


These measurements suggest that there is a potential pool of a quarter of the customers who pass the broccolini who stop momentarily in the vicinity of the broccolini. When the price is lowered and there is information alerting customers to the 'better deal' the conversion rate to making a purchase is dramatically improved. The total number of customers that interact with the Broccolini did not increase which suggests that the promotion has not attracted any additional consumers above those already interested in broccolini,

Repeat Buying

During phase 2, 21% of the broccolini purchases were made by loyalty card holders, compared to 18% during phase 1 (benchmarking).

The figure below shows the pattern of frequency of broccolini purchases during benchmarking and intervention phases. 70% of loyalty card holders only bought broccolini once in the month, during phase 2 (benchmarking). There were two customers who bought Broccolini five times in the month and their average spend was $3.58 (approximately 1.5 bunches). It is important to note that the number of loyalty card holders who purchased twice during phase 2 was higher than in phase 1.

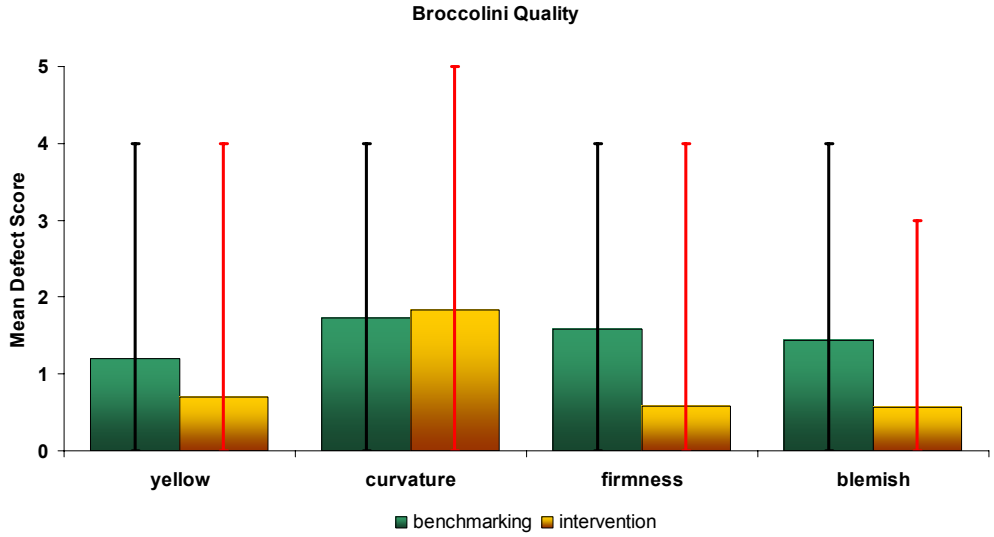


Product Quality

Broccolini product quality did vary widely from excellent (0 score for defects) to unacceptable (scores of 4 or 5 for some quality parameters) during phase 1 and phase 2. It is important to note that the average yellowing, curvature, firmness and blemishes on average were all ratings of better than 2 but that the range included some significantly poor quality product in terms of all 4 quality parameters within the displays. During phase 2, the broccolini quality was generally of a good standard and better than the quality recorded during phase 1.

This needs to be considered in light of the consumer survey results. Most of the survey participants indicated that the quality was the most important factor in their decision to buy.
Within quality:

- Most rated colour and firmness of broccolini stems as important to overall broccolini quality.
- 69% rated the amount of yellow flowers as important.
- Other quality attributes such as stem straightness, length and numbers within a bunch were not considered important.
- 47% of those surveyed indicated that they were still prepared to buy stems that were severely bent.
- Only 9% of those surveyed were prepared to buy broccolini bunches with severe stem damage or high numbers of flowering heads.



It is highly likely that when wide variation in product quality on the shelf occurs and significantly poor quality product is present within the display, sales of broccolini are inhibited.

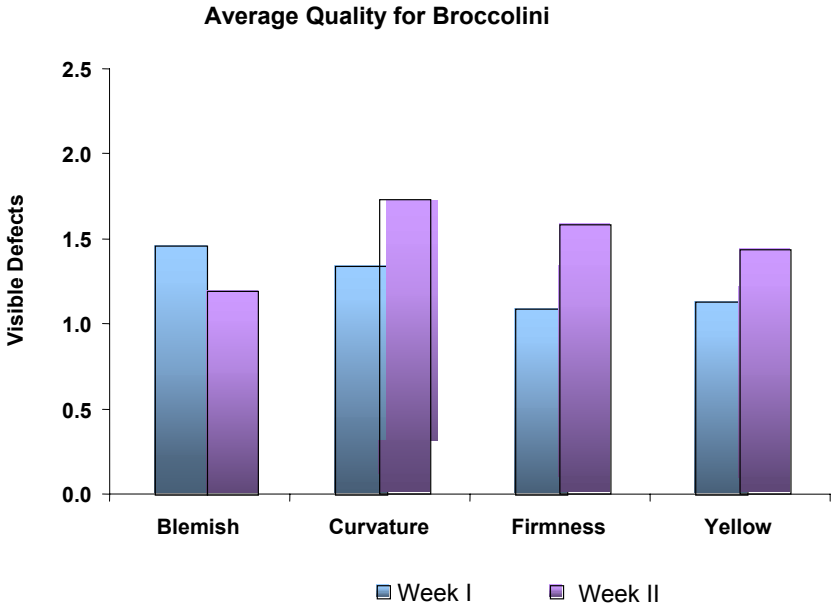
Quality assessment rating systems	
Yellowing	**Firmness (turgidity - degree of movement of stems)**
0 - no yellowing present	0 - virtually no movement of stem end (<2cm movement)
1 - very minor yellowing (1-5 Broccolini florets showing flower)	1 - (2-4 cm movement of stem end)
2 - slight yellowing (6-10 florets open)	2 - (4-6 cm movement)
3 - moderate yellowing (11-20 florets); minor chlorosis	3 - (6-8 cm movement)
4 - significant yellowing; further chlorosis of florets and plant parts	4 - (8-10 cm movement)
5 - severe yellowing and chlorosis	5 - (>10 cm movement)

Curvature of stems	Blemishes, rots - overall quality
0 - no curvature	0 - no blemishing or rots present
1 - very minor curvature (1-10 degrees)	1 - very minor blemishing (1-5%)
2 - slight curvature (11-20)	2 - slight blemishing (6-10%)
3 - moderate curvature (21-30)	3 - moderate blemishing (11-20%)
4 - significant curvature (31-40)	4 - noticeable blemishing (21-30%)
5 - severe curvature (>41 degrees)	5 - severe blemishing (>31%)
	Blue = Possibly unacceptable Red = Not Acceptable

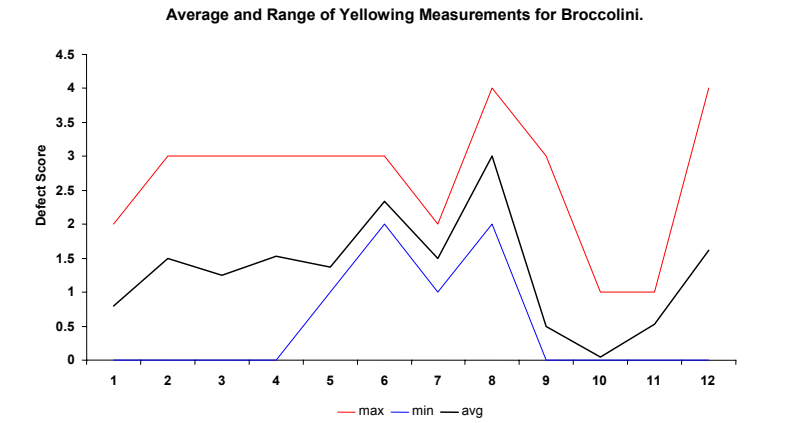
The overall limit of commercial acceptability is anticipated to be a score of 2.5. By this standard while the average overall display was always good, not all the Broccolini on the shelf was commercially acceptable. The scoring of yellowing is probably more sensitive than normal customer standards, with a very small number of florets being partly open being quite acceptable, but slight yellowing of the green florets (score of 3) being regarded as a quality blemish. The firmness conversely is probably regarded more seriously by customers and a firmness score of 2 would be the limit of commercial acceptability.

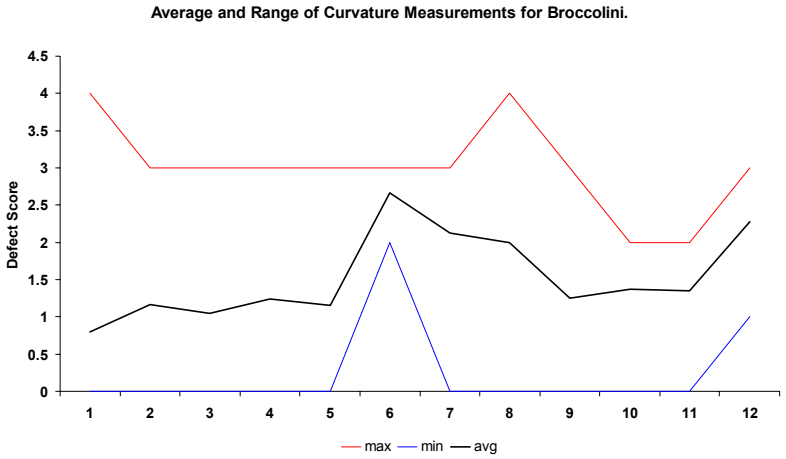
Product Rotation

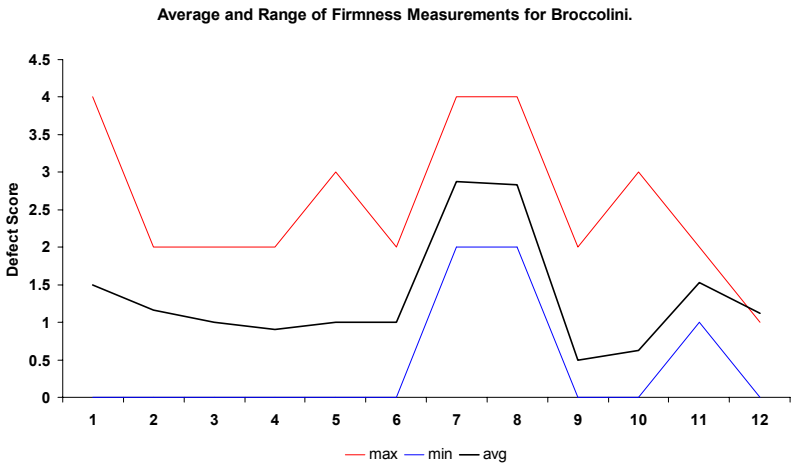
The retention of the broccolini bunches on the shelf was monitored over two weeks in November using colour coded tape. Each day was assigned its own colour and the number of bunches with various coloured tape was recorded daily to give an indication of bunch rotation and the freshness of the shelf display. In general, the broccolini display in week II (15-22/11/04) showed more firmness loss, curvature and yellowing but slightly fewer blemishes than week I (1-6/11/04), as shown below.



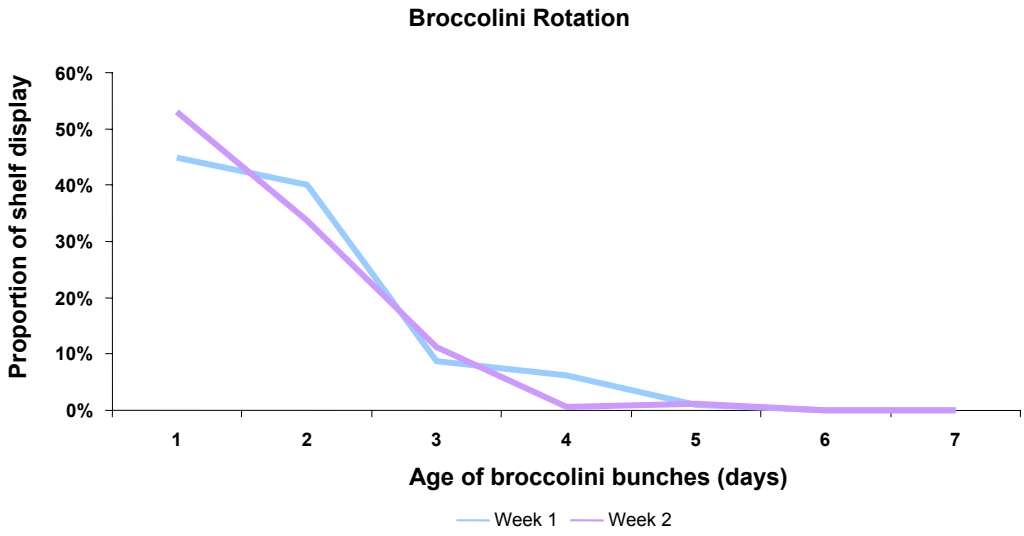
There was higher variation in the average levels of each of the subjective quality defects during week II. The quality was more uniform during the first week of November; with only Saturday 6/11/2004 displaying bunches with moderate yellowing and curvature. During week II bunches showed a far larger range in yellowing and firmness.



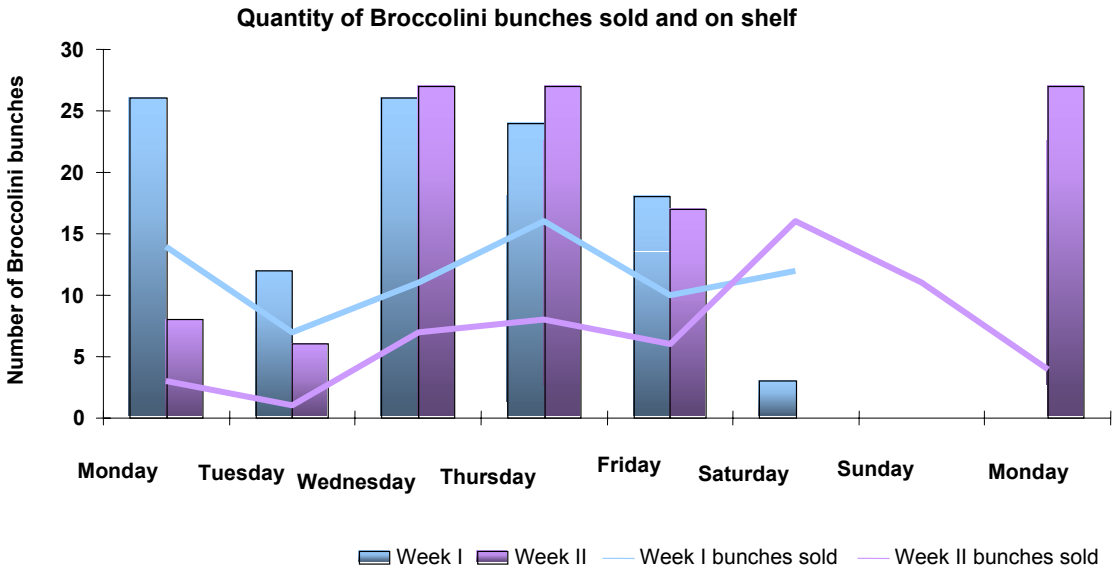




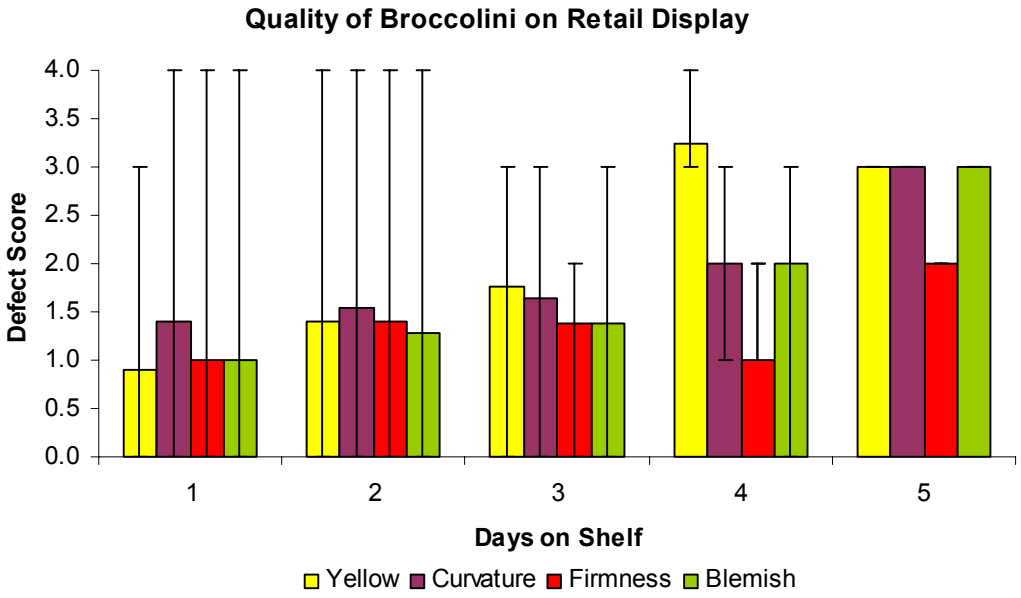
The broccolini display consisted mainly of one and two day old bunches, with approximately 15% being three days or older as shown in the figure below. However, on the Tuesday of both monitored weeks (2/11/2004 and 16/11/2004) there were no fresh bunches added to the display. The Broccolini display appeared to be restocked with fresh produce on Monday and during both weeks some of this produce is retained on the shelf until the following Friday. A major restock (80%) of the display with broccolini occurred on Wednesday and then another lesser restock on Thursday (33-44%). During Week I there was one further restock of 56% on Friday.



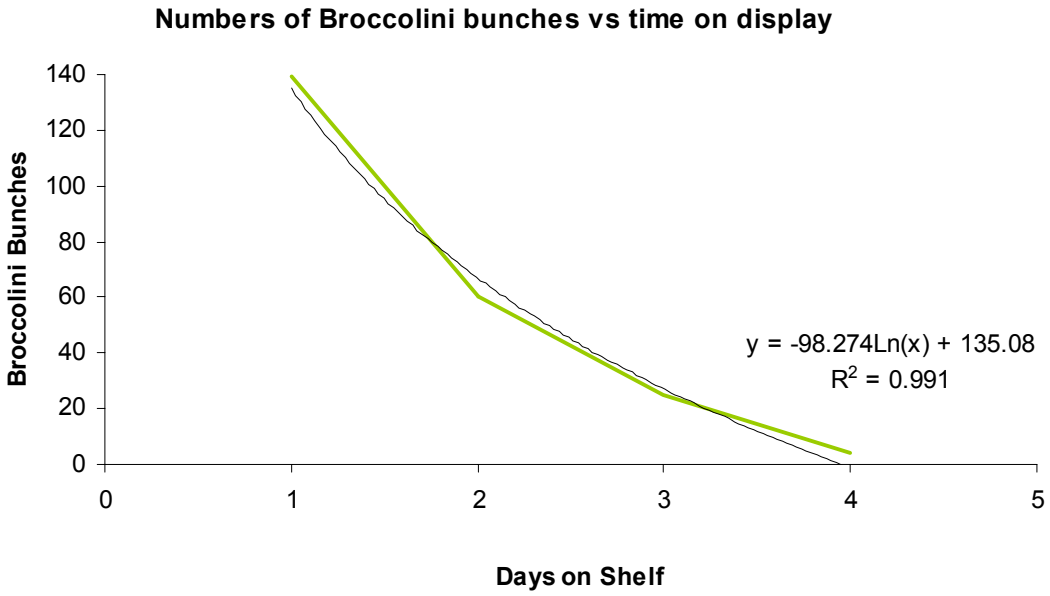
The number of bunches on the shelf also varied over the two weeks monitored, varying from less than five to 27 bunches. For both weeks the Broccolini shelf was 'under-stocked' on Tuesday. This may be in part associated with lower sales on these days.



The average quality of broccolini bunches on the shelf display for the two weeks of measurement is shown below. Bunches that were left on the display for 4 or 5 days showed a large increase in defects. It is uncertain whether this is due to increased degradation over time or perhaps the bunches already showed these levels of defects and were therefore left on the display by consumers.



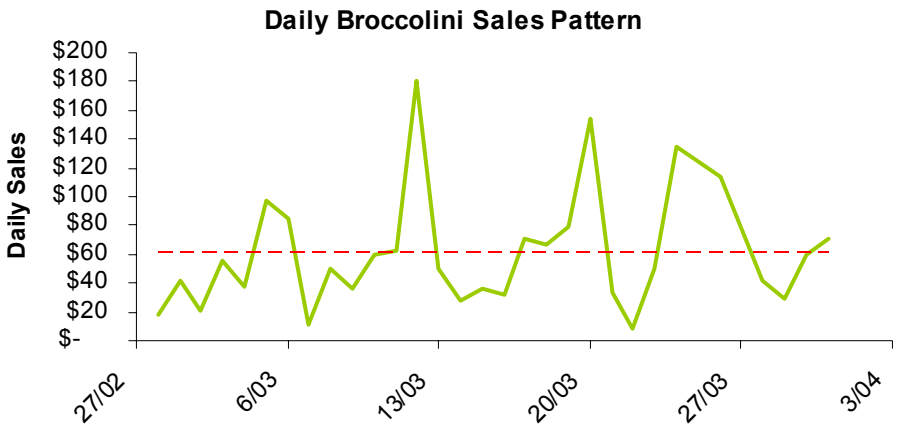
The retention or turnover of broccolini bunches on the display decreases in a logarithmic fashion as shown in the graph below, there is still a few four day old bunches on display.



Sales Analysis

Daily Sales

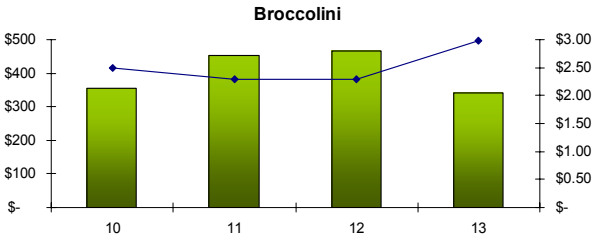
The Broccolini sales data show a cyclical pattern with a large variation in sales between days during phases 1 and 2. This pattern is typical of smaller lines. All three products showed very high sales on Easter Thursday. The other three high sales days for broccolini are the days when there were in-store promotions which lead to increased customer awareness or interest. The in-store demonstrations increased sales on the day, but there was no effect on the following days and there was no evidence of a residual lift in overall sales as a result of the three promotions.

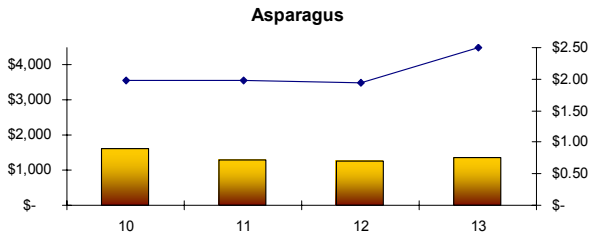


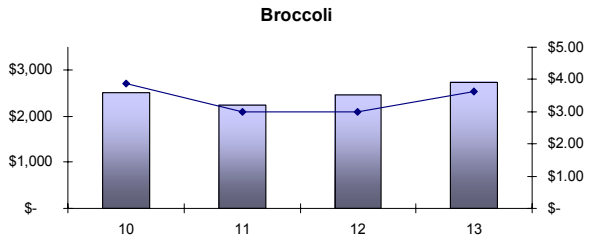
Weekly Sales Summary

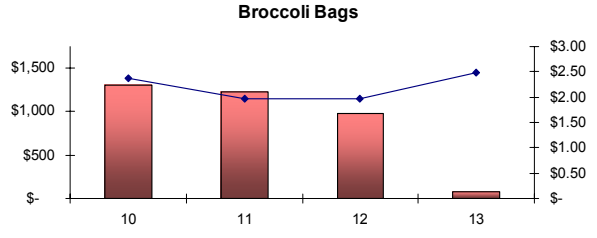
The average weekly sales of the broccolini, broccoli, broccoli bunches and asparagus for week 10 (starting on 28/02/05) to week 14 (starting on 28/03/05) - are shown in the following figures (bars are total weekly sales and lines are average weekly price).

Weekly Sales for Intervention

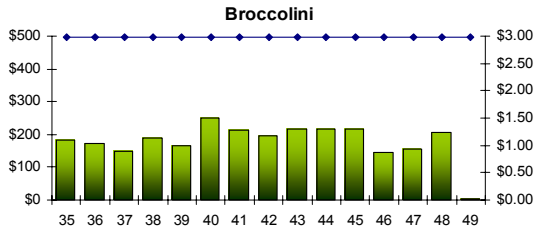


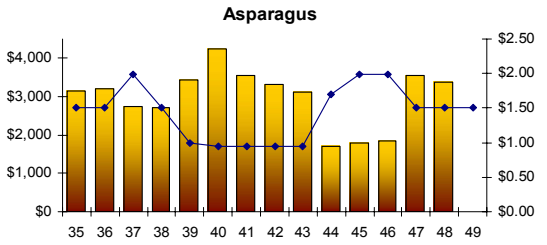


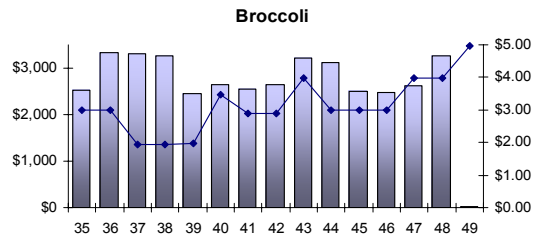


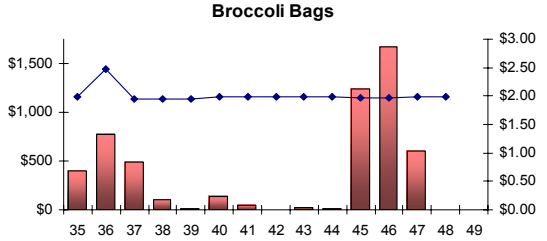


Weekly Sales for Benchmarking









Broccolini

Week 11 displayed an increase in sales that corresponded to a drop in price from $2.50 to $2.29/bunch which was maintained the following week at the same special price. There was a marked drop in sales when the price increased to $2.99 during week 13. The changes in the Broccolini price and resulting sales did not affect any of the other products monitored.

Asparagus

The price of asparagus remained constant throughout most of March ($1.98/kg) but weekly sales showed variation between $1253 and $1623. Overall asparagus sales were under half those during the benchmarking phase. The average daily sales for asparagus fell from $577 to $205 between the two periods. This is likely due to seasonal supply.

Broccoli

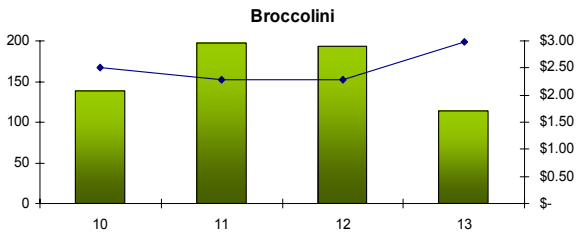
Broccoli sales decreased from the benchmarking phase with a weekly average of $2486 compared to $2852 in the earlier period. The quantity of broccoli sales varied within a $500 range while the price varied between $2.97/kg and $3.89/kg. These variations were in line with those measured during benchmarking and did not match movements in Broccolini sales.

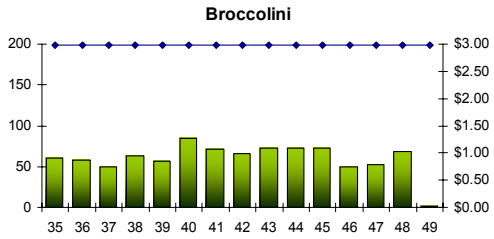
Broccoli bunches

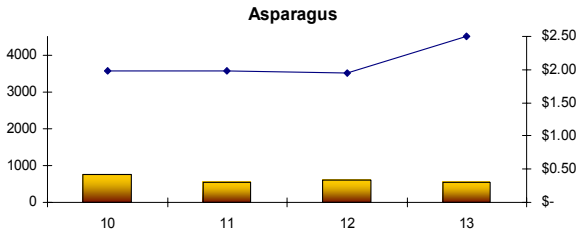
Broccoli bunches showed higher average weekly sales during the intervention phase from $84 to $149 when available.

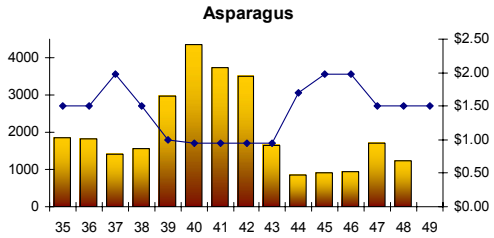
This second set of figures (below) show the total quantity of product sold on a weekly basis for the two periods. The quantity of Broccolini bunches sold have risen dramatically between the two periods. Conversely, asparagus and broccoli have decreased significantly.

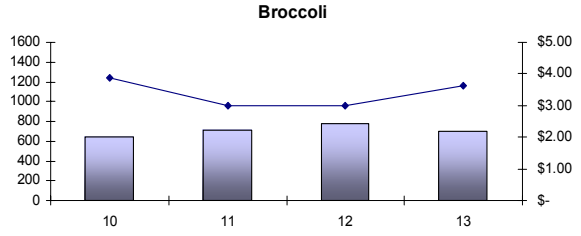
Volume of Sales - Intervention **Volume of Sales -Benchmarking**

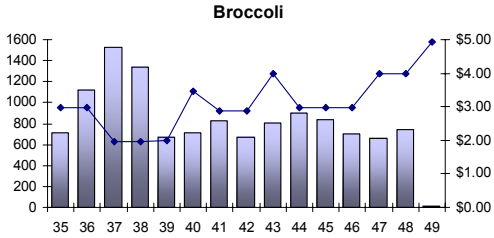


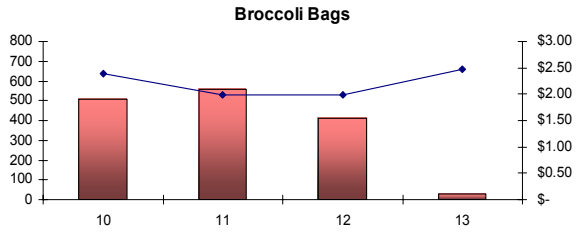


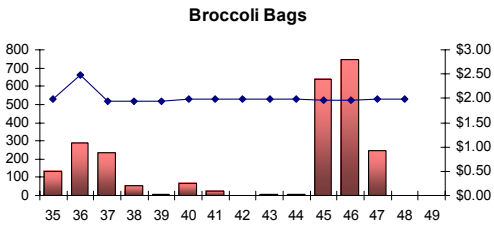




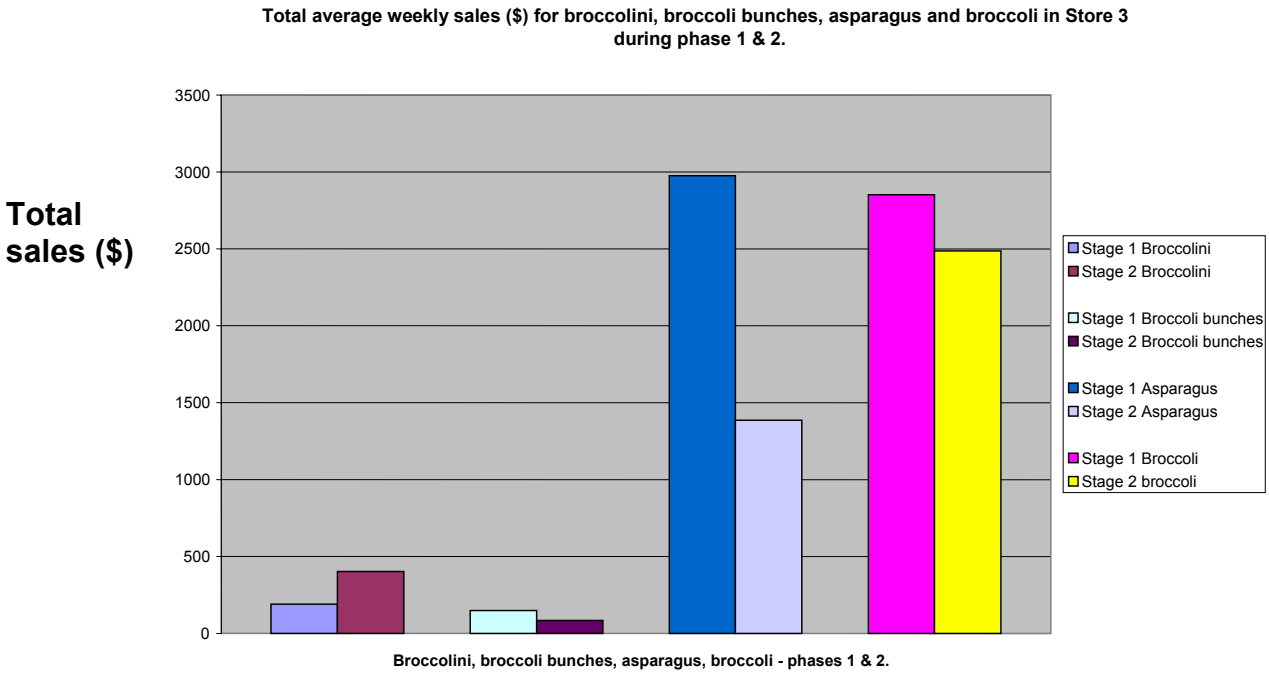






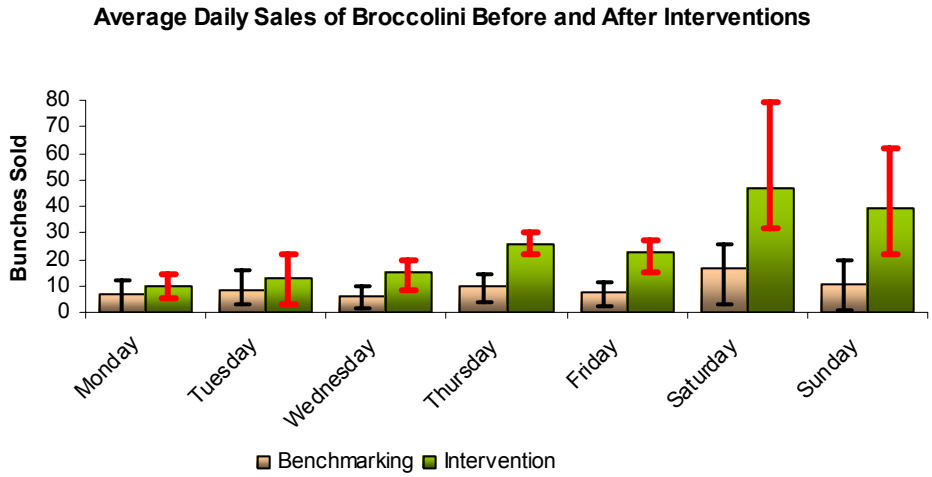


The broccolini weekly sales averaged $403 approximately twice the benchmarking period sales, asparagus $1385 and broccoli $2486. Broccoli bunches had higher sales during the intervention phase in March 2005 with sales of $896 compared to $153 during the 2004 benchmarking period.



Day of the Week Pattern

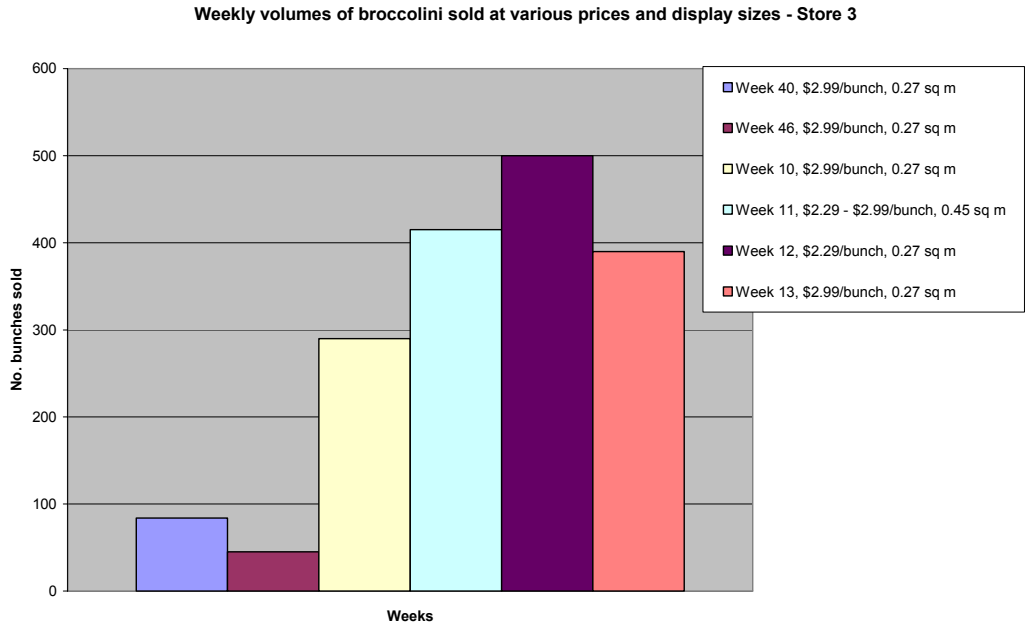
A day of the week sales pattern is apparent for the broccolini transactions, as seen in the figure below which shows the pattern for phase 2. Monday and Wednesday have the least sales and high sales were recorded for Saturday each week. The range from week to week is very high (orange bars). This is similar to the pattern observed in phase 1 (benchmarking). Easter Thursday showed high sales ($97.58)compared to any other day (average that week was $60.64).



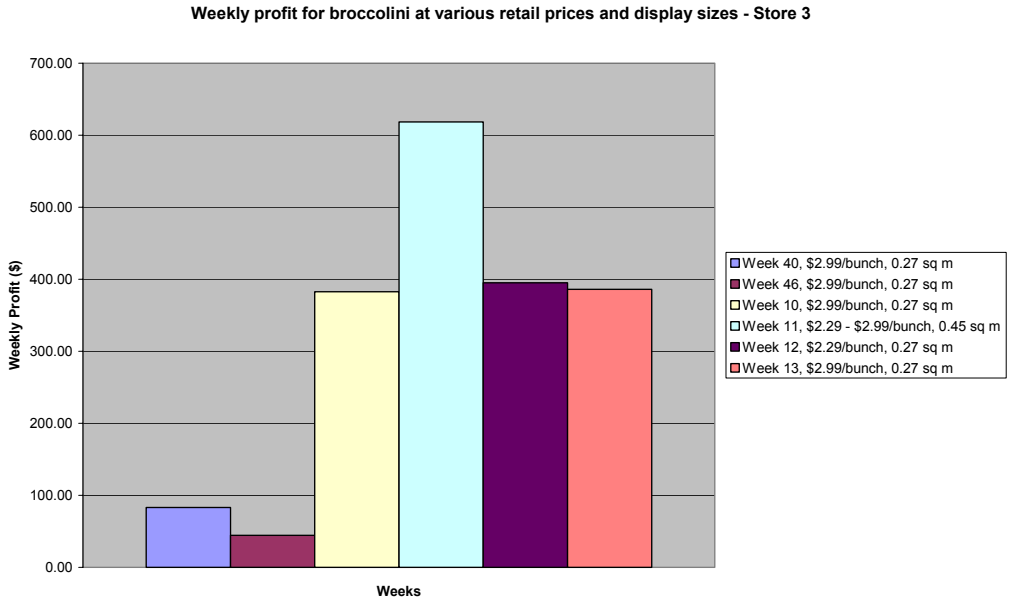
Sales and Profitability of Broccolini during the Project - STORE 3

As previously mentioned, in late 2004, phase 1 (known as the benchmarking study) was carried out to establish current sales and customer activity for that time of the year and situation. Then in early 2005 during phase 2, (Weeks 10 to 13, 28/02/05 to 27/03/05) the following interventions were made:

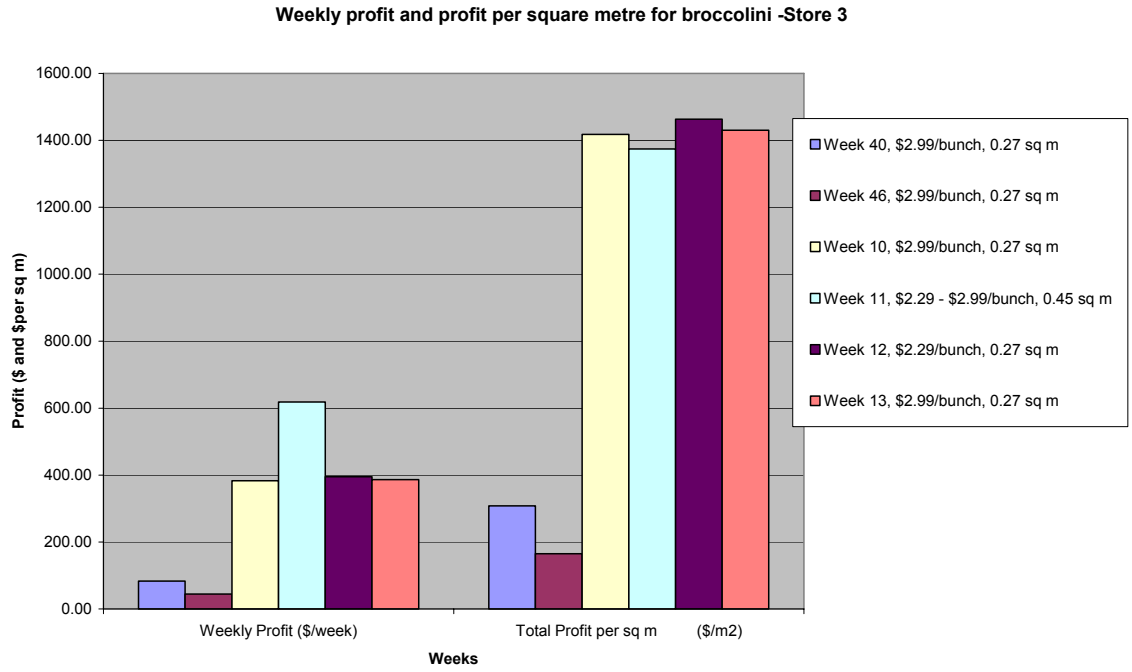
- The price was lowered from over $2.50 to $2.29 for nine days starting in Week 11 and then rose back to $2.99 by Week 13.
- The store's signage was added to the display to alert customers to the special price.
- In-store promotions were carried out on three occasions.
- Display size was doubled for Week 11 (50 x 90 cm) and then reduced back to its original size from Week 12 (30 x 90 cm) onwards. This size increase was done in conjunction with a price change.



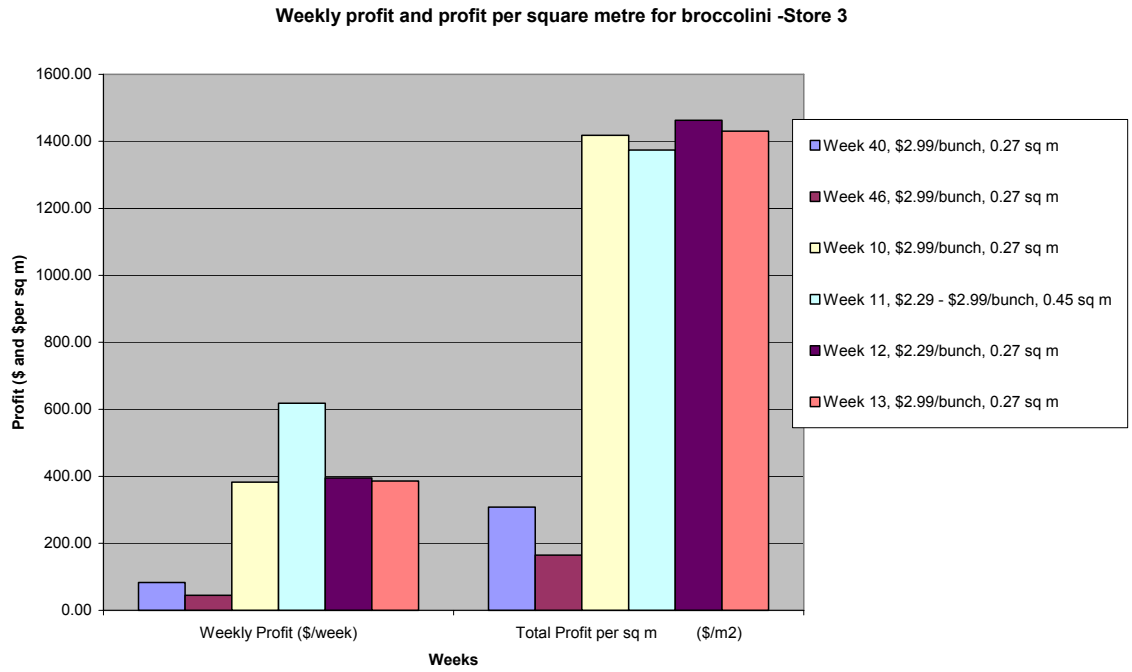
The highest number of bunches sold in any one week during the 2 monitoring phases was in week 12 when the sale price was $2.29 per bunch and the display size was 0.27 sq m. Sales in all weeks of phase 2 (intervention) were markedly higher than the lowest and highest weekly volumes recorded during phase 1 (benchmarking).



The weekly profit for broccolini was higher in all weeks of phase 2 compared to the highest and lowest weekly profits in phase 1. It is interesting to note that highest profit was in week 11 (over $600) and weeks 10, 12 and 13 showed profits of $380 - $400 compared to phase 1 where the highest and lowest weekly profits were $83 and $45 respectively.



The profit per square metre is closely related to the volumes sold, the size of the display and the GP%. Profit per square metre is markedly higher in all weeks of phase 2 compared to phase 1. Weekly profits per square metre of about $1400 per square metre were recorded in all 4 weeks (10 to 14) compared to the range of $165 to $308 per square metre during phase 1.



Effect of Shelf Size

The shelf size was increased from 30 x 100cm to 50 x 100cm for Week 11 and then was returned to the original size from Week 12 onwards. The effect of changing the shelf size on sales appeared to be minimal as shown in the two figures above.

Appendix 1

Broccolini Customer Survey

1. **Have you seen this vegetable before?** yes/no

2. **How often do you buy broccolini?**

   1. more than once a week 2. about once a week 3. about twice a month

   4. about once a month 5. less than once a month 6. never

DEMOGRAPHICS

1. **How often do you shop for fruit and vegetables at a speciality fruit and vegetable store?**

   1. more than once a week 2. about once a week 3. about twice a month

   4. about once a month 5. less than once a month 6. never

2. **How often do you shop for fruit and vegetables at a supermarket?**

   1. more than once a week 2. about once a week 3. about twice a month

   4. about once a month 5. less than once a month 6. never

3. **Who are you shopping for?**

   1. Single 2. Flat 3. Couple 4. Family

4. **Gender** F/M

5. **Age**

   1. Under 25 2. 25 to 34 3. 35 to 50 4. Over 50

BROCCOLINI

1. **Where do you buy broccolini? And why?**

2. **If you decide not to buy broccolini what do you buy instead?**

3. **Is broccolini on your "shopping list"?** yes/no

4. **What influences your decision on whether to purchase broccolini?**
   (Choose one or more of the following)

1. Quality of broccolini	2. Display and presentation
3. Availability of recipe ideas and information	4. Not always available where I shop
5. Price	6. Price of other vegetables. *If yes, any other vegetables in particular?*
7. Don't like broccolini	8. Other reason/s

5. **What quality characteristics are important to you when purchasing broccolini?**
(Choose one or more of the following)

1. Colour of bunches	2. Presence of yellow flowers
3. Length of stems	4. No of stems in the bunch
5. Firmness of stems	6. Straightness of stems
7. Size of the bunch	8. Other

For questions 6-8, please look at the provided pictures of broccolini.

6. **Yellow flowers are sometimes present in broccolini. Would you be prepared to buy the broccolini shown in the provided pictures? (yes or no for each picture)**

   Picture A Picture B Picture C

7. **Broccolini stems can vary in straightness. Would you be prepared to buy the broccolini shown in the provided pictures? (yes or no for each picture)**

   Picture A Picture B Picture C Picture D

8. **Broccolini stems might have scuff marks and blemishes. Would you be prepared to buy the broccolini shown in the provided pictures (yes or no for each picture)**

   Picture A Picture B Picture C

9. **How would you rate the quality of broccolini for overall appeal at the stores where you buy it?**

   1 2 3 4 5
   not at all appealing *extremely appealing*

10. **How do you normally serve/use broccolini?**

    1. Steamed 2. Stir fry 3. Raw / Salad 4. Other

11. **Do you know that broccolini is not genetically modified?**

12. **Any general comments about broccolini in retail stores?**

PFA consumer survey - pictures of broccolini to be shown with questions 6-8

With Q6. Yellow flowers are sometimes present in broccolini. Would you be prepared to buy the broccolini shown below?

A

B

C

With Q7. Broccolini stems sometimes vary in straightness. Would you be prepared to buy the broccolini shown below?

A

B

C

D

With Q8. Broccolini stems might have scuff marks and blemishes. Would you be prepared to buy broccolini shown below?

A

B

C

Appendix 2

Instructions and labels sent to participants for the Perfection Fresh-Broccolini trial

Logger instructions – Grower/packhouse

Thank you for assisting us with the Perfection Fresh – Broccolini project. We are looking to monitor temperatures of Broccolini from harvest through to the retail store. If you can help us by following the below protocol, it will greatly assist us in acquiring temperature information.

- You have been provided 3 loggers (small metal disc within a plastic casing) which collect temperature data at regular intervals. Orange ribbons are also attached to the loggers. Please store the loggers in the refrigerator before use.
- When you are about to pack Broccolini into boxes, initiate the loggers by placing them into hot water for about 30 min.
- Remove the loggers from the water and place in the middle of a box containing Broccolini (one logger per box). Allow the ribbon to hang about 15cm outside so that the box can be easily identified.
- Fill details on the yellow sticker provided and attach it to the box.
- Please fax or email details (*i*.e. harvest date, pack date, comments) of the consignment to:

Stephen Morris
Sydney Postharvest Laboratory
PO Box 62
North Ryde, NSW 1670
Sydney

Phone: 2 949 08443
Mobile: 0410 603 170
Fax: 9490 8499
email: scmorris@postharvest.com.au

Your help will be much appreciated.

Logger instructions – Perfection Fresh Distribution Centre

Thank you for assisting us with the Perfection Fresh – Broccolini project. We are monitoring temperatures of Broccolini from harvest through to the retail store. If you can help us by following the below protocol, it will greatly assist us in collecting valuable temperature data.

- Temperature loggers have been placed in 6 boxes of Broccolini from 2 different growers (3 boxes from each grower). Consignments with loggers are identified by an orange ribbon hanging outside the box. Growers details are:
    - Joe Vizzari, 2960 Pakemham Rd, Kooweerup, VIC
    - Tony Wright, 265 Lathams Rd, Meerlieu, VIC
- Separate the 6 boxes containing loggers/ribbons on delivery and record the date and time of delivery on the yellow sticker attached to the box.
- Dispatch:
    - 2 boxes (1 box from each grower) to Penrith Plaza Growers Market, Shop 22, Penrith Plaza Wholesale and Retail
    - 2 boxes (1 box from each grower) to Fruit Ezy, Shop LG7, Chatswood Chase, 345 Victoria Ave, Chatswood, 2067
    - 2 boxes (1 box from each grower) to LoSurdo's, 153-155 Macquarie Centre, North Ryde, 2113
- If Broccolini are to be collected by the store, please ensure that the 2 correct boxes are given to the agent/courier.

For queries, please contact:

Stephen Morris
Sydney Postharvest Laboratory
PO Box 62
North Ryde, NSW 1670
Sydney

Phone: 2 949 08443
Mobile: 0410 603 170
Fax: 9490 8499
email: scmorris@postharvest.com.au

Your help will be much appreciated.

Logger instructions – Retail store

Thank you for assisting us with the Perfection Fresh – Broccolini project. We are looking to monitor temperatures from harvest through to the retail store. If you can help us by following the below protocol, it will greatly assist us in collecting valuable temperature data.

- Temperature loggers (small metal disc within plastic casing) have been placed in 2 boxes of Broccolini for your store. Consignments with loggers are identified by an orange ribbon hanging outside the box.
- Fill in date and time of arrival of Broccolini on the yellow sticker attached to the box.
- When placing the product on display in the store, remove the logger and the yellow sticker – keep both please.
- Place logger in hot water for about 30 minutes. Afterwards, place the logger in the refrigerator.
- Sydney Postharvest Laboratory will retrieve the loggers and stickers.

Any Queries:

Stephen Morris
Sydney Postharvest Laboratory
PO Box 62
North Ryde, NSW 1670
Sydney

Phone: 2 949 08443
Mobile: 0410 603 170
Fax: 9490 8499
email: scmorris@postharvest.com.au

Your help will be much appreciated.

Broccolini Temperature Loggers Information Label		*Place label in the plastic sleeve & tape to the Broccolini carton*
Grower/packhouse: **Harvest date:** **Pack date:** **Comments:**		**Data Logger No 1**
Perfection Fresh Warehouse Homebush:	**Perfection Fresh Sales Stand Sydney Markets:**	**Retail store: Penrith Growers**
Arrival Date: **Arrival time:** **Comments:**	**Arrival Date:** **Arrival time:** **Comments:**	**Date - product on display** **Time - product on display** **Comments:**