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## **Information and WTP: fruit quality perceptions and consumer satisfaction**

**Nigel Poole and Laura Martínez-Carrasco**  
[n.poole@imperial.ac.uk](mailto:n.poole@imperial.ac.uk)



**Paper prepared for presentation at the I Mediterranean Conference of Agro-Food Social Scientists. 103<sup>rd</sup> EAAE Seminar ‘Adding Value to the Agro-Food Supply Chain in the Future Euromediterranean Space’. Barcelona, Spain, April 23<sup>rd</sup> - 25<sup>th</sup>, 2007**

# **Information and WTP: fruit quality perceptions and consumer satisfaction**

**Nigel Poole (corresponding author)**

**n.poole@imperial.ac.uk**

**and Laura Martínez-Carrasco**

## ***Abstract***

Consumers face information problems in choosing certain types of foods that best match their preferences and assure satisfaction. For fresh fruits, expectations about the eating experience cannot be assured through external inspection of the product at the time of purchase, nor necessarily through experience. Limited information provided by the supply industry, unexploited product differentiation by marketers, and lack of awareness among consumers of quality attributes, of the intrinsic heterogeneity of fresh produce, can lead to reduced consumer satisfaction, which in turn affects consumption patterns and attenuates the impact of policy initiatives to improve diet and health.

The research reported here employed the second price Vickrey experimental auction method to test consumer perceptions of fruit quality by evaluating the willingness to pay (WTP) of consumers for five different varieties of soft citrus under three different information conditions: visual inspection of the fruit before peeling; visual inspection after peeling; and after consumption. Significant differences were found in valuations of the different varieties as consumers gained information. Juiciness, sweetness and acidity were the attributes most closely correlated with WTP under conditions of full information, and also with the overall evaluation of the different varieties.

Implications for growers, traders, and for policy are inferred from the results. Growers and marketers must know not only about consumer behaviour in general, but must gather market information about purchasing and consumption behaviour in relation to preferences for specific products. The potential mismatch between the purchase decision and satisfaction poses challenges for policy makers hoping to change dietary habits. In countries where dietary patterns, global food distribution systems and consumption patterns are changing fastest, and where health indicators are most under threat, the message is that governments should continue to engage actively with the food industry in the promotion of healthy products.

# **Information and WTP: fruit quality perceptions and consumer satisfaction**

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information about purchasing and consumption behaviour in relation to preferences for specific products. The potential mismatch between the purchase decision and satisfaction poses challenges for policy makers hoping to change dietary habits. In countries where dietary patterns, global food distribution systems and consumption patterns are changing fastest, and where health indicators are most under threat, the message is that governments should continue to engage actively with the food industry in the promotion of healthy products.

## **1 Introduction**

Consumers face information problems in choosing certain types of foods that best match their preferences and assure satisfaction. For fresh fruits, expectations about the eating experience cannot be assured through external inspection of the product at the time of purchase, nor necessarily through experience. Limited information provided by the supply industry, unexploited product differentiation by marketers, and lack of awareness among consumers of quality attributes, and of the intrinsic heterogeneity of fresh produce, can lead to reduced consumer satisfaction, which in turn affects consumption patterns and attenuates the impact of policy initiatives to improve diet and health (Poole, 1996; Poole & Baron, 1996; Poole & Gray, 2002, 2003). This article reports research which probes these information problems experienced by consumers and explores information policies that might enhance dietary choices and the satisfaction – even pleasure – of healthy eating.

### **1.1 Fruit and vegetables, diet and health**

Low fruit and vegetable (F&V) intake is a characteristic of a poor diet that is one of the major risk factors in chronic diseases (Department of Health, 2003). The WHO ‘Global Strategy on Diet, Physical Activity and Health’ (WHO, undated) stresses the strength of the scientific evidence that a change in dietary habits can powerfully influence health in well- or over-fed

societies: F&V are an excellent source of antioxidant nutrients which are thought to lower the risk of heart disease and several types of cancer, and are a good source of fibre which helps control cholesterol levels; F&V are beneficial to salt balance which is particularly important in cases of hypertension, and provide vitamins in addition to antioxidants, including folic acid which has been linked to the prevention of birth defects. Research also suggests that low levels of F&V consumption may be linked to antisocial behaviour (Gesch, Hammond, Hampson, Eves, & Crowder, 2002). And last but not least, the link between ill-health and 'obesogenic' diets – such as those low in F&V – has important economic dimensions (McCarthy, 2004).

National governments (eg Department of Health, 2003) are concerned about diet and health, and there has been renewed recognition within the European Union of the role of public policy in promoting healthy diets: paragraph 4.2.4 of the European Commission proposal for 'Healthier, safer, more confident citizens: a health and consumer protection strategy' (CEC, 2005) addresses the need for better informed and educated consumers with the aim of 'Ensuring that consumers, through better information, are able to make informed, environmentally and socially responsible choices on food, the most advantageous products and services, and those that correspond most to their lifestyle objectives thus building up trust and confidence'.

In fact, nutrition transition towards unhealthy diets, which is occurring at a faster rate in developing countries than was the case for developed countries, is a global problem (Fraser, 2005; WHO, undated).

## **1.2 Food policy, information and health**

There are many ways in which public policy aims to influence food consumption patterns, and interventions on health claims and labelling mandated by government policy are widely accepted (Ippolito, 1999). According to Cheftel (2005) EU intentions on nutrition labelling aim to facilitate consumer understanding and informed dietary choice, combat the obesity problem, reduce salt intake and promote overall well-being by encouraging healthy diet and lifestyles; and also contribute to the management of public health costs. In the US, labelling with sugar content information has been found to be a useful tool in reducing consumption (Weaver & Finke, 2003). Nevertheless, labelling is limited in scope. In the EU, for example, mandatory food labelling mainly concerns ingredients; and nutrition labelling is optional unless a nutritional claim is being made, and mainly covers the physical and chemical properties of foodstuffs (Przyrembel, 2004). The effectiveness of communication through labelling has come under scrutiny, and less information may in fact communicate more (Wansink, Sonka, & Hasler, 2004), but the absence of labelling in the catering sector is a notable weakness in health promotion. Baltas' (2001) review of issues and policies in nutrition labelling likewise the primacy of educational and health-promoting elements in food policy. There is no information linking dietary choices and the satisfaction – even pleasure – of healthy eating.

However, to change consumption behaviour, one must also recognise that in the end, the principal reason why consumers choose food products is pleasure: 'For most individuals, the motivation to eat a piece of fruit is not that it contains an impressive list of nutrients and important non-nutrient components. It is not even the knowledge that increased fruit (and vegetable) consumption may decrease the risk of several types of cancer. The major

motivation to eat a piece of fruit is the fact that it tastes good... [which] is a concept that has been mostly ignored by nutrition messages of the past several years' (Goldberg, 2000: 644).

It must be remembered that there is a diversity of media for communicating with food consumers. Implementing food and nutrition policies needs the resources and incentives of the market in addition to the public sector role (Ippolito, 1999). Glanz and Hoelscher (2004) envisage partnerships between the public health authorities and private players including commercial restaurant chains in the formulation and dissemination of appropriate information. Moreover, advocacy by concerned groups, governmental pressure and efforts of the mass media have stimulated important responses by major manufacturers and food service firms towards healthier products. Nevertheless, although the food industry has an education role, advertising is almost unequivocally focused on pleasure.

### **1.3 Buying behaviour and quality attributes**

How fruits and vegetables are marketed is the strategic decision of producers, wholesalers and retailers, designed to influence consumer purchasing behaviour. Any policy or commercial initiatives, education and information provision that can influence consumers to improve dietary habits will have important public and private benefits. And because diet and health are linked to economics (McCarthy, 2004), the potential to improve the well-being of the poor is significant. Thus there is a need for greater understanding by policy makers of consumer awareness, purchasing and consumption behaviour with particular reference to fruit and vegetable characteristics, and how consumers derive satisfaction from their purchases, in order to develop effective health-promoting initiatives. 'Epicurism', or the 'pleasure' factor, may prove to be an additional pathway to changing behaviour.



Models of consumer behaviour suggest that purchasing decisions are a complex process with a number of stages (Engel & Blackwell, 1982):

- recognition of necessities: the difference between actual and desired states...
- search for information about products...
- evaluation of alternatives...
- selection and purchase...
- the results of which feedback into the next purchase.

The evaluation of alternatives is key to choice, and is based on the processing of information from different sources about different factors which affect the purchaser's perceptions of quality (Olson & Jacoby, 1972). At the moment of purchase consumers choose those products that they believe are most likely to satisfy their preferences, on the basis of the information that is available.

When purchasing fresh fruit, information is derived by consumers from their own experience, and from their perceptions of the extrinsic and intrinsic product attributes. In considering fruit quality, the difference between 'search' and 'experience' quality attributes is vital:

- the quality of a product can be understood as a 'search' good if the consumer is able to obtain information about the relevant attributes through inspection;
- quality is an 'experience' good if consumers can identify the attributes through purchase and consumption (Nelson, 1970).

For citrus fruit, search attributes include the physical appearance, such as colour and size, information about which is gained at the point of sale by inspection. The intrinsic organoleptic qualities are more complex and less easily quantified: the distinctive flavours of the individual citrus varieties depend on the varying proportions of oils, aromas and essences in the juice. Sweetness and ‘sharpness’ depend on sugar and acid levels. Texture depends on the pectins and proteins that act as natural emulsifiers, on the nature of the pulp, and other solid material (Kimball, 1999). The consumer cannot inspect these attributes before purchase, but can evaluate them during consumption and learn by experience.

It is evident that ignorance by consumers of product attributes at the time of purchase can lead to a mismatch between purchases and consumption preferences (Poole, 1996; Poole & Baron, 1996). Research by Sulé Alonso *et al.* (2002) on the perceived quality of fruit showed that intrinsic attributes exert a greater influence on perceived quality in fruit products than do extrinsic attributes, but it is the extrinsic attributes - size, texture and shape - that are the most used evaluate the quality of fruits. Moreover, industry practices which enhance external characteristics (such as degreening to enhance colour) may impair intrinsic characteristics of eating quality (Poole & Gray, 2002, 2003).

This article reports research which used an experimental auction technique to evaluate the influence of extrinsic and intrinsic characteristics of fruit and how increasing levels of information (search and experience attributes) affect perceptions of quality throughout the latter stages of the consumption process, including the results and feedback – in this case of soft citrus (mandarins). Section 2 briefly discusses the research techniques, section 3 presents the actual methodology employed, section 4 evaluates the results, and in section 5 conclusions are drawn.

## 2 Experimental auctions in the evaluation of consumer preferences

Experimental auctions have become an important technique to determine consumers' willingness to pay as an alternative to contingent valuation methods, which have been criticised for hypothetical bias (see for example, List, (2003)). The principal advantage of experimental auctions is that a real product and real money are used. Therefore, the procedure replicates as closely as possible the actual purchase decision process.

Experimental auctions are increasingly applied to economic and business problems such as consumer concerns about emerging technologies like irradiation and genetic modification, fears over food-borne illnesses and the perceived value of improved food safety, the value placed on meat quality, etc (see Jaeger *et al.*, (2004)).

Different auction methods have been tried: English auctions use a bidding procedure with prices ascending until only one – winning - participant remains; the Becker-De Groot-Marschak (BDM) auction in which individual participants submit sealed bids which 'win' if they exceed a randomly drawn price 'threshold' (Becker, De Groot, & Marshak, 1964); and the sealed-bid auction comparable to the English auction, in which individuals are asked to submit a sealed bid which corresponds to the maximum price they would agree to pay for a particular product. A common version of this employs the second price mechanism, in which the highest bidder actually pays for the product the second highest bid price (the 2<sup>nd</sup> price Vickrey auction). This mechanism encourages bidders to use the simplest optimal strategy, that of bidding the true valuation<sup>1</sup> (Vickrey, 1961).

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<sup>1</sup> It is always the most profitable strategy for a bidder to bid an amount equal to his valuation for the product, no matter what strategy the other bidders adopt, and no matter what the risk aversion level of the bidder. By bidding lower than his/her valuation, the bidder lowers his/her probability of receiving the item, but does not lower the price he/she pays if he/she receives the item, making him/her unambiguously worse off, in terms of expected payoff, than he/she is by bidding his/her valuation. By bidding higher, he/she increases the probability of winning the item, but only at prices that exceed the valuation, also making him/her worse off.

A number of researchers have tried to compare hedonic ratings and experimental auctions to evaluate food preferences. Lange *et al.* (Lange, Martin, Chabanet, Combris, & Issanchou, 2002) aimed to evaluate the effects of sensory characteristics and external information on the overall evaluation of five Champagnes by dividing the sample of participants into two groups, one of which participated in a Vickrey auction and the other one in a hedonic test. In research by Noussair *et al.* (2004), the comparison between both methods was conducted within subjects, as the same subjects took part in a Vickrey or BDM auction and a hedonic test simultaneously. They concluded that there is no reason to use an auction to elicit average preferences because hedonic ratings provided similar aggregate results and they were easier to conduct.

However, it is possible that the results by Noussair *et al.* (2004) might be biased since bidding behaviour may be altered by a previous rating. For this reason, in this research half of the participants took part only in a 2<sup>nd</sup> price Vickrey auction and the other half took part in a hedonic test and a 2<sup>nd</sup> price Vickrey auction simultaneously in order to check if bidding behaviour might be influenced by the previous rating. The auction procedure is described in next section.

### **3 Methodology**

Participants were recruited among university students at Imperial College London (Wye Campus) and staff and friends. The only requirement was to be mandarin purchaser. Eight auctions were conducted during two consecutive days in February 2005. This guaranteed that the quality and freshness of the fruit remained similar during all the auction sessions. The number of participants in each session varied between 9 and 11. Each session lasted about

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one and a half hours. The total number of participants was 80 of whom 58 (73%) were students<sup>2</sup>.

When participants in each session arrived at the venue, each was given £15 for participating in the bidding process. After the researchers explained the procedure, participants signed a commitment to buy the product if they won the auction. Participants were informed that the best strategy was to bid exactly what it was worth to them to obtain the product.

A training auction was conducted with a bag of crisps, in order to familiarize participants with the auction procedure. The real mandarin auction consisted of three stages. At the first stage, participants had the opportunity to examine the mandarins placed on a table in front of them, without touching the product. Then they were asked to submit, on a confidential bidding sheet, the highest amount of money that they were willing to pay for a 'net' (a bag of about 850g) of mandarins. At stage 2 they were asked to peel the fruit and submit their bids again. Finally, at stage 3, they were allowed to taste the fruit and re-submit their bids. This procedure was repeated for five different fruit varieties: Clemenules and Clemenvilla from Spain, Nour from Morocco, Suntina from Israel and Minneola from Turkey, acquired from three different supermarket chains. None of this product and sourcing information was shown to participants during the exercise.

At the completion of the auction, 15 bids were collected from each participant (5 types of mandarins x 3 stages). A number from 1–15 – for example '7' - was drawn at random to determine the binding situation. All other 14 bids were ignored and the result focused on the highest bidder and the price in stage 7. Once the binding bid was determined, the winning

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<sup>2</sup> Full demographic data are available from the authors. Participants were: 36/64% male/female; 38/62% under/over 21 years of age; 46% British, with 54% from elsewhere in Europe, Latin America, Africa and Asia.

bidder paid the 2<sup>nd</sup> highest bid price in stage 7 and received the net of mandarins. The tendency to bias is minimised through this procedure because respondents know that they must pay the price if they win the selected bid. However, a potential weakness is that a ‘poor and calculating’ participant may choose to bid very low in order to avoid all chance of winning, thereby securing the full cash payment of £15.

After finishing the auction, participants were asked to complete a rating sheet for scoring different product attributes: colour of the peel, size, ease of peeling, juiciness, sweetness and acidity. They were also asked to give an overall score for each variety. The last task was to complete a brief questionnaire to collect demographic and purchase behaviour data, including the importance of different attributes at the time of purchase.

## **4 Results**

### **4.1 Bidding/scoring behaviour and mandarin comparison**

At stage 1, ie, when the only information that participants had was the visual appearance of the fruits, average bids and scores were very similar for all mandarins (Table 1), suggesting that consumers do not distinguish between different varieties on the basis of visual appearance. Only significant differences between two pairs of mandarin bids (Clemenules and Nour; Nour and Minneola) were found. At this stage, Minneola was the most valued mandarin attracting the highest bid.

**Table 1** Average bids (£) and scores for each mandarin at each stage

	Clemenules		Nour		Minneola		Clemenvilla		Suntina	
	Bid	Score	Bid	Score	Bid	Score	Bid	Score	Bid	Score
<i>Stage 1</i>	0.98	4.19 <sup>a</sup>	0.91	4.05 <sup>a</sup>	1.01	4.22 <sup>a</sup>	0.94	3.70 <sup>a</sup>	0.96	3.89 <sup>a</sup>
<i>Stage 2</i>	0.97	4.57 <sup>a</sup>	1.22	4.49 <sup>a</sup>	0.82	3.65 <sup>a</sup>	0.97	4.05 <sup>a</sup>	0.90	4.00 <sup>a</sup>
<i>Stage 3</i>	0.89	4.00 <sup>a</sup>	0.89	3.89 <sup>a</sup>	0.60	2.73 <sup>a</sup>	1.17	5.03 <sup>a</sup>	0.98	4.32 <sup>a</sup>
<i>Overall<sup>b</sup></i>		4.68		4.19		2.71		4.87		4.69

(a) Values determined from only half of the sample

(b) Values provided for the whole sample at the end of the auction, after valuing several mandarin attributes

As participants passed to stage 2 (touching and peeling<sup>3</sup>), only scores for Nour increased significantly, with the rest of mandarin scores remaining statistically similar. Nour was the most highly valued variety at this stage. Bidding behaviour differed from scores, since scores for Nour and Clemenvilla increased significantly and scores for Clemenules, Minneola and Suntina decreased significantly.

As participants passed to stage 3 (tasting), bidding and scoring behaviour were very similar. At this stage, the scores and bids for the varieties Clemenules, Minneola and Nour decreased significantly. Conversely, Clemenvilla and Suntina scores and bids increased significantly. Clemenvilla and Suntina were the most highly valued varieties, attracting the highest bids, followed by Clemenules and Nour. Minneola was the least valued and attracted the lowest bids, with a great difference from the others (Table 1). Significant differences between seven pairs of mandarin bids and scores were found at this stage.

<sup>3</sup> Observation of the procedure suggested that participant score and bid behaviour was based not only on the ease of peeling, but also on the inner appearance of the fruit, particularly the presence or absence of 'stringy' pulp.

This suggests that there was little difference perceived by participants between varieties at the beginning, and that consumers view 'mandarins' as a homogeneous category. Nevertheless, varietal differences became apparent to participants during testing, through peeling and tasting. If this bidding and scoring behaviour reflects normal purchase behaviour, consumers are buying some varieties based on visual appearance, eg Minneola, which they actually do not like when tasting. Conversely, they might not be buying some varieties, eg Clemenvilla or Suntina, which they really like when tasting.

#### **4.2 Mandarin attribute scores**

As regards average mandarin attribute scores (colour, size, ease of peeling, juiciness, sweetness and acidity), the variety Clemenules was highly valued on all attributes, and especially on size and ease of peeling. Nour was also highly valued on all attributes (although less than Clemenules), but on the peelability characteristic the variety scored particularly highly. Minneola was the variety least valued on all attributes, except for colour of the peel, which scored highly. Nevertheless, the fruit achieved a good score on size and juiciness, which suggests ways in which they can be marketed to consumers. Clemenvilla was the most valued on juiciness and acidity and also received the highest overall score. The main weakness was the peelability. Suntina was highly valued on all attributes, except for ease of peeling, and scored highly on acidity and sweetness (see Table 2). These findings may help retailers to design an appropriate marketing mix for each variety.

Mandarin overall scores on a scale from 1 to 7 (1 = “I don’t like it at all” and 7 = “I like it very much”) were the following (from highest to lowest): Clemenvilla (4.87), Suntina (4.69), Clemenules (4.68), Nour (4.19) and Minneola (2.71).



**Table 2** *Mandarin attributes and overall score*

	Clemenules	Nour	Minneola	Clemenvilla	Suntina
Colour	4.76	4.13	<b>5.20</b>	4.93	4.41
Size	<b>5.18</b>	4.39	4.66	4.82	5.05
Ease of peeling	<b>5.44</b>	<b>5.44</b>	3.29	3.37	3.77
Juiciness	4.67	4.61	4.35	<b>5.28</b>	4.60
Sweetness	4.73	4.24	2.53	<b>4.92</b>	<b>4.92</b>
Acidity	4.25	4.21	2.80	4.67	<b>4.75</b>
<i>Overall score</i>	<i>4.68</i>	<i>4.19</i>	<i>2.71</i>	<b>4.87</b>	<i>4.69</i>

Scores in bold indicate varietal superiority for that attribute.

Tables 3, 4, and 5 display the bivariate correlations between different mandarin attributes and bids at stage 3, scores at stage 3 and overall scores respectively.

Price bids and scores at stage 3 (with complete information), and overall scores (after attribute scoring) are mainly correlated with juiciness, sweetness and acidity. Mandarin overall scores are also correlated with peelability, colour or size (but only in some varieties). This suggests that consumers base the overall fruit evaluation on attributes (juiciness, sweetness and acidity) that cannot be evaluated during the purchase process.

**Table 3** *Bivariate correlations between stage 3 bids and mandarin attributes*

		Colour	Size	Peeling	Juiciness	Sweetness	Acidity
Clemenules	Pearson	0.077	0.084	0.162	0.171	0.319**	0.320**
	Sig.	0.512	0.476	0.165	0.142	0.005	0.005
Nour	Pearson	0.112	0.262*	0.135	0.386**	0.396**	0.311**
	Sig.	0.340	0.024	0.247	0.001	0.000	0.007
Minneola	Pearson	0.030	0.056	0.009	0.398**	0.508**	0.599**
	Sig.	0.795	0.637	0.940	0.000	0.000	0.000
Clemenvilla	Pearson	-0.001	-0.020	0.171	0.247*	0.319**	0.228**
	Sig.	0.993	0.868	0.143	0.033	0.005	0.050
Suntina	Pearson	0.204	0.081	0.227*	0.541**	0.418**	0.506**
	Sig.	0.079	0.490	0.050	0.000	0.000	0.000

\* and \*\* indicate significant correlations at 95% and 99% level respectively

**Table 4** *Bivariate correlations between stage 3 scores and mandarin attributes*

		Colour	Size	Peeling	Juiciness	Sweetness	Acidity
Clemenules	Pearson	0.234	0.084	-0.162	0.223	0.520**	0.363**
	Sig.	0.163	0.628	0.339	0.186	0.001	0.027
Nour	Pearson	0.256	0.272	0.015	0.536**	0.440**	0.467**
	Sig.	0.126	0.109	0.931	0.001	0.006	0.004
Minneola	Pearson	0.179	0.259	0.108	0.422**	0.668**	0.829**
	Sig.	0.289	0.128	0.525	0.009	0.000	0.000
Clemenvilla	Pearson	0.194	0.000	0.182	0.349*	0.552**	0.398*
	Sig.	0.250	1.000	0.281	0.034	0.000	0.015
Suntina	Pearson	0.161	0.285	0.376*	0.468**	0.387*	0.448**
	Sig.	0.341	0.092	0.022	0.004	0.018	0.005

\* and \*\* indicate significant correlations at 95% and 99% level respectively

**Table 5** *Bivariate correlations between overall scores and mandarin attributes*

		Colour	Size	Peeling	Juiciness	Sweetness	Acidity
Clemenules	Pearson	0.148	0.286*	-0.076	0.563**	0.697**	0.634**
	Sig.	0.204	0.013	0.517	0.000	0.000	0.000
Nour	Pearson	0.502	0.335*	0.141	0.603**	0.756**	0.674**
	Sig.	0.000	0.004	0.227	0.000	0.000	0.000
Minneola	Pearson	0.043	0.016	0.106	0.452**	0.655**	0.788**
	Sig.	0.713	0.895	0.363	0.000	0.000	0.000
Clemenvilla	Pearson	0.267*	0.276*	0.347**	0.693**	0.701**	0.591**
	Sig.	0.020	0.017	0.002	0.000	0.000	0.000
Suntina	Pearson	0.132	0.217	0.275*	0.634**	0.621**	0.453**
	Sig.	0.258	0.064	0.017	0.000	0.000	0.000

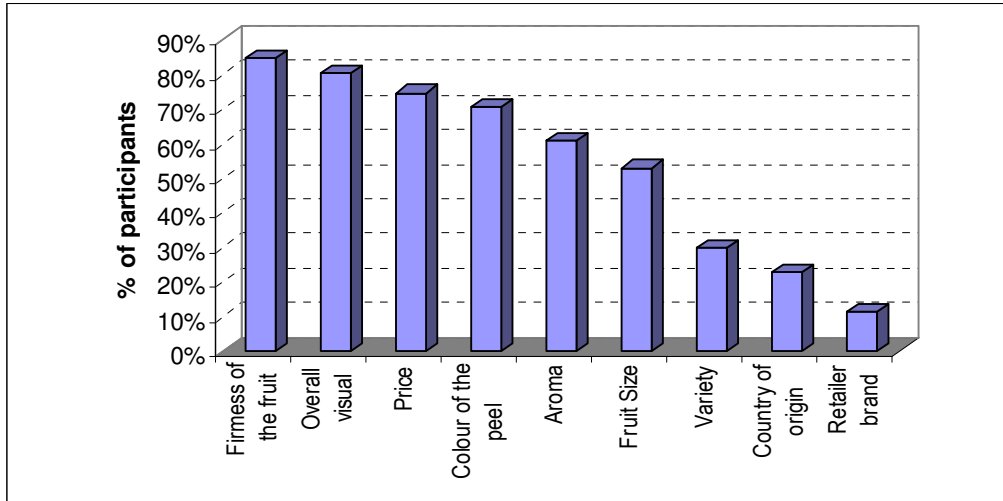
\* and \*\* indicate significant correlations at 95% and 99% level respectively

### 4.3 Attributes implicated in the purchase decision

Participants' purchase decisions were based mainly on overall visual appearance, firmness of the fruit, and price. On a scale from 1 to 7 which indicates the importance of the factor in the purchase decision, these attributes are scored at 5.5, 5.4 and 5.3 respectively. Moreover, nearly 80% of participants considered these attributes as important or very important in the mandarin purchase decision. Colour of peel (5.1), aroma (4.8) and fruit size (4.3) are also relevant respectively for 70%, 60% and 50% of participants. Variety (3.6), country of origin (3.0) and retailer brand (2.7) are considered less important with only 34%, 27% and 11% of participants respectively considering these attributes to be important or very important (Figure 1).

**Figure 1** *Attributes by importance*

Percentage of participants who considered *important* or *very important* each of the attributes in the purchase decision



#### **4.4 Methodological implications**

One-way ANOVA was used to investigate differences between the two experimental treatments: participants who scored the fruits before submitting the bids might do so with a higher level of reflection which could help them with the bidding process and therefore, bidding behaviour would be different compared with those participants who did not score the fruits. Findings show that there were no significant differences in bidding behaviour between subjects that scored the mandarins before submitting the bids and subjects that did not, and therefore the scoring process did not affect bidding behaviour.

The scoring behaviour of participants closely reflected bid behaviour. Only when subjects passed to stage 2 did scoring and bidding behaviour differ, since the changes observed were more significant in the bidding process than in the scoring process. Nevertheless, behaviour at stages 1 and 3, and the overall trend at stage 2 are very similar with both methods. Therefore, the auction procedure has been validated as a methodology to evaluate

preferences. Nevertheless, as Noussair *et al.* (2004) stated, the decision of using or not an experimental auction will depend on the research objectives, because this procedure is more difficult to implement than a common hedonic test.

The only significant demographic difference within the sample was the level of the bids between students and non-student participants: students bid consistently lower. In other respects, there were no significant differences in the evolution of bids and mandarin preferences.

## **5 Conclusions**

There are three sets of conclusions to be drawn relating to 1) considerations of methodology and the results themselves, 2) implications for public policy, and 3) implications in relation to commercial opportunities.

### **5.1 Methodology and results**

From a methodological point of view, bidding behaviour closely reflected scoring behaviour which serves as a validation of the auction procedure to evaluate food preferences. Participants' behaviour was not affected by engaging in the preference scoring. The evolution of the three-stage procedure suggests that at first, consumers view mandarins as a homogeneous category when they are visually inspected, and that varietal differences appear during testing as more information about the experience attributes of the product becomes available to participants. This procedure also confirmed the perception, importance and rating of different search and experience attributes of products during purchase, and demonstrated how 'experience' modified perceptions of product quality and scoring behaviour, and how 'experience' is likely to affect repurchase decisions. These findings suggest that the methodology has wider potential for use in the food industry, for better understanding of

consumer behaviour that could lead to more effective health promotion campaigns, and also various lessons for retailers and marketers about promotion.

The principal determinants of purchase are overall visual appearance, firmness of the fruit and price. However, extrinsic characteristics are not good indicators of the intrinsic attributes and inherent mandarin varietal differences that determine consumer satisfaction. Therefore, consumer satisfaction will not be maximised by product purchase decisions based on the valuation of search qualities which do not reflect the intrinsic characteristics perceived during the actual consumption experience. Therefore, there is likely to be a mismatch between the purchase decision and the satisfaction derived. Moreover, a repurchase decision is imperilled by a negative consumption experience, and confusion resulting from the mismatch is likely to taint consumption within the whole category.

The principal determinants of consumption valuation are sweetness, juiciness and acidity, which in the experiment were closely correlated with bidding only at stage three after consumption. It can be inferred that consumers know what consumption experience they want, but the heterogeneous nature of the mandarin category and the limited information at purchase means that they cannot acquire the necessary information prior to consumption.

This research explicitly excluded credence attributes of the products such as country of origin and varietal name, not least because the research process lasted nearly two hours, and it was felt that participants would be unwilling to spend more time on another round of information. However, the effect on buying behaviour of disclosing credence attributes would provide valuable further understanding of consumer behaviour.

## **5.2 Public policy implications: win-win-win**

The potential mismatch between the purchase decision and the satisfaction or pleasure derived during consumption poses challenges for policy makers hoping to change dietary habits. However, it is not often that commercial opportunities for the food industry coincide with the imperative for improving public health: the case of the F&V sector is one in which the industry, consumers and governments can all be winners. In countries where dietary patterns, global food distribution systems and consumption patterns are changing fastest, and where health indicators are most under threat – not simply the ‘fat’ and affluent west but increasingly urban populations in developing countries also - the message is that governments should continue to engage with the food industry not just to constrain the promotion and consumption of unhealthy foodstuffs, but actively to engage in the promotion of healthy products that give pleasure to consumers. Besides broader education initiatives and direct promotion of healthy habits, approaches to product labelling can take into account the communication advantages of brevity (Wansink, Sonka, & Hasler, 2004): succinct messages can be directed to consumers at diverse decision-making points about the eating qualities of different fruits and vegetables.

This need to give attention to eating quality is of relevance to public sector agencies. Most nutrition communication and food information research is focused on educating the consumer to make healthy choices, and insufficient attention has been paid to the pleasure of healthy eating: ‘epicurism’. Education relies too much on disciplinary ‘sticks’, and not enough on flavoursome ‘carrots’. This research shows that information about product characteristics has potential to better inform consumers about F&V products, and to better align food purchases with eating preferences where product characteristics are poorly understood. That is to say, policy makers need to note that to improve the nutritional quality of food choices and

consumer health, ‘epicurism’ should accompany ‘education’: information should be oriented also towards increasing pleasure and consumer satisfaction besides educating consumers about ingredients.

Product-specific information is important. In the case of citrus fruit, all the evidence suggests that mandarins cannot be treated as homogeneous products – let alone as a constituent of a larger ‘citrus’ category. Varieties matter, whether consumers realise it or not. Moreover, varietal differences in other fruits are likely to be of equal significance in the consumption experience. One can suggest that the provision of simple information to purchasers at decision-making points about the ‘grittiness’ of pears and the ‘wooliness’ of apples might lead to purchasing decisions that are more consistent with consumption preferences, with improved dietary and health consequences in the wider population, and with growth of the commercially valuable fresh fruit sector.

### **5.3 Implications for growers and distributors**

For communicating product attribute information other than nutritional content, the influence of policy makers may be less persuasive than that of the industry. Public-private information partnerships are necessary to promote the pleasure of healthy eating. Glanz and Hoelscher (2004) pointed out that in the US, the knowledge about and strategies for promoting healthy nutrition are heavily weighted toward individually-oriented behavioural and educational approaches. They identified restaurants as an environmental and policy intervention point for improving nutrition through increasing F&V consumption of the whole population and not just small groups of motivated or high-risk individuals. Provision of point-of-purchase information in restaurants is one such intervention strategy that can guide healthy choices. A range of in-store and community strategies are also feasible interventions (Glanz & Yaroch,



2004). These could include cafeterias in public sector institutions such as schools and prisons. In-store tasting is another approach to provide consumers with better product information.

More than retailers and distributors, it is the product specialists such as growers and suppliers who must know not only about consumer behaviour in general, but who should gather market information about purchasing and consumption behaviour in relation to preferences for specific products. Once aware of market demands, growers and marketers can choose the varieties with consumption characteristics which are highly valued by consumers – and possibly find appropriate uses, such as juicing, for fruit varieties that are less appreciated, at least for ‘whole’ consumption. Moreover, retailers will choose to deal with suppliers who can add value such as detailed market knowledge; they are also expected to supply in-store advertising materials and recipes for food products (Queen, 2005). Therefore, understanding consumer behaviour and preferences is an important potential source of competitive advantage for such firms.

These commercial challenges are greatest for suppliers with limited market research resources who are geographically distant from foreign consumer markets characterised by purchasing and consumption preferences with which they are unfamiliar. This is particularly relevant to developing country exporters, for whom acquiring market knowledge is essential.

Finally, there is another important challenge to marketers, which is the variability inherent in the product – citrus, at least. The variability between varieties in the levels of the various characteristics tested in this experiment is something well understood by growers and traders, but, as demonstrated, less so by consumers. There is variability also within varieties between seasons; and within seasons and varieties there is variability between production sites,

between trees, and between fruit on the same tree depending on the exposure to sunlight, and maybe other factors. Again this is well understood by growers, and to some extent by traders, perhaps less so by retailers.

Participants in the experiment were surprised to observe differences between fruits in the same net, and even between segments in the same fruit. The existence of such high, inherent and multiple levels of heterogeneity in the all-important consumption characteristics – and heterogeneity in preferences among different classes of consumers - need careful handling by marketers.

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