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Comparison of Taste Panel Results from Supermarket and Laboratory Panels

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Mean flavour scores from taste panellists in a supermarket were higher than those from laboratory tasters on the same set of tomato fruit samples. This suggests that data from laboratory taste panels cannot be extrapolated directly to a market place situation—at least for tomatoes. There was reasonable agreement between flavour scores of the supermarket panellists. Supermarket panellists in a high socio-economic class area gave less favourable flavour ratings to tomato fruit than those in a low socio-economic class area. Of the two people who presented the samples to the 480 supermarket panellists, one had a tendency to choose older tasters than the other.

Introduction

Laboratory taste panel tests on foods generate many useful data which are used/interpreted in a number of ways. One use is to get preliminary information on the possible appeal or level of acceptability of a particular food or food product to consumers. The reliability of such data is open to debate and it can be argued that the only way to get information on consumer acceptability is by doing a full scale consumer panel.

The reasons for carrying out this study were threefold. Firstly, supermarket panels gave unexpectedly high flavour scores (in relation to fruit composition values) to late season tomato fruit in preliminary tests carried out in this laboratory (1). Secondly, there is little published information (2) on the direct comparison of laboratory and consumer panels, and thirdly, this topic was pinpointed at EEC agro-food workshops as one worthy of investigation. Having said this, the current study is only a modest start to a much wider range of tests on different food products needed to investigate more fully the relationship between laboratory and consumer taste panels.

This study was carried out as part of the ongoing Agro-Food Programme (1984-1988) of the Standing Committee for Agricultural Research of the Commission of the European Communities (3) and provided useful data in an area where there is a paucity of published information (2).

Materials and methods

Supermarket vs laboratory panels

Uniformly ripe and sized greenhouse tomatoes selected from a monocrop (M) and an interplanted crop system (I) were harvested on a Monday and were stored at ambient temperature (15-20°C) until Thursday and Friday of the same week when they were evaluated for flavour by a total of 480 consumers in two supermarkets of the same chain located at Sutton (high socio-economic class area) and Northside (low socio-economic class area) in Dublin county. The tasting schedule is shown in Table 1 and each consumer was intercepted at random in the course of his/her supermarket shopping and was taken aside for the tasting. While these panels were carried out using 480 consumers, it was felt more appropriate

to call them 'supermarket' rather than consumer panels as the latter has connotations of thousands of tasters. A similar tasting schedule (to that shown in Table 1) was used for an experienced laboratory panel at Kinsealy Research Centre except that the same people (31-37 tasters) were used for each of the four sessions. The term experienced is used here to indicate panellists who took part frequently in taste testing and were familiar with evaluating a wide range of fruit and vegetable products.

Samples were presented simultaneously at the supermarkets and at the laboratory. A male and female presented the supermarket samples to consumers while a male presented the samples to the laboratory panel. Each taster evaluated only a single sample (one quarter of a tomato fruit) for flavour on a hedonic scale as follows: excellent, +3; very good, +2; good, +1; moderate, 0; poor, -1; very poor, -2; extremely poor, -3. This tasting system was identical to that reported previously from this laboratory (4). The experiment was carried out in July and was repeated in September.

Flavour score agreement—'groups of four'

Since each taster received one quarter of a tomato, every tomato was tasted by four tasters and this enabled a comparison to be made of the response of each of the four tasters. The assumption was made that each quarter (fruit sliced vertically through the calyx region/blossom end, and then quartered) had the same composition. This gave rise to 120 'groups of four' among the supermarket tasters. The greatest possible

Table 1 Schedule for supermarket tasting (480 people)

		Supermarket at:	
		Northside	Sutton
Thursday	a.m.	Sample M (60) ¹	Sample M (60) ²
	p.m.	Sample I (60) ¹	Sample I (60) ²
Friday	a.m.	Sample M (60) ²	Sample M (60) ¹
	p.m.	Sample I (60) ²	Sample I (60) ¹

¹60 tasters; male presenting the samples.

²60 tasters; female presenting the samples

divergence among four tasters is six units, i.e. one person giving the sample a (+3) and another giving it a (-3).

Tomato fruit composition, colour, firmness

Samples of the tomatoes presented for tasting were tested for soluble solids (SS), titratable acidity (TA), electrical conductivity (EC) of the diluted fruit puree, colour (Hunter *a/b* ratio) and firmness (values in N for a 5 mm fruit compression) as described previously (5).

Seven-point scale vs line scoring

A follow-up test was carried out using 120 tasters at supermarket level and 33 laboratory panellists to compare the 7-point scoring system used above with a 6 cm line system with the end points of 'extremely poor flavour' and 'excellent flavour'; the mid point of the line was then assigned a zero score and the extremes +3 and -3 for computation of the results. A single tomato sample was used each time and the panellists were asked to place the sample on the 7-point scale or to mark the line at the point corresponding to the flavour of the sample.

Results

Supermarket vs laboratory panels

The data (Table 2) show that the supermarket panel gave a higher flavour rating to the samples than the laboratory panel, especially at the July testing date. Fruit composition data for samples M and I were similar on the July testing date (Table 3) and this was reflected in the scores of both panels. In September, sample I had a superior composition to sample M; however, this was reflected in the score of the supermarket panel only (Table 2). The supermarket panels gave both samples a higher score in July than in September with the difference being most marked for the monocrop sample. In contrast the laboratory panel scored the July and September samples about equal.

Presenter and location comparisons

The data from which Table 2 was prepared were used to study the effect, if any, of the person presenting (female vs male presenter) the samples on the supermarket panel response. The results (Table 4) show an inconsistent effect with samples presented by the female receiving the lowest panel response in the July test but the highest in the September test. The data

Table 2 Taste panel scores (supermarket and laboratory taste panels) for tomato fruit from a monocrop (M) and an interplanted crop system (I)

Flavour category	Frequency (No. of panellists)			
	Supermarket panel sample		Laboratory panel sample	
	M	I	M	I
<i>July test date</i>				
Excellent (+3)	40	26	4	2
Very good (+2)	95	110	14	16
Good (+1)	57	63	26	21
Moderate (0)	29	29	19	16
Poor (-1)	7	9	7	9
Very poor (-2)	4	2	2	0
Extremely poor (-3)	8	1	0	1
Flavour score	+1.37	+1.44	+0.76	+0.72
No. of tasters	240	240	72	65
<i>September test date</i>				
Excellent (+3)	12	26	2	0
Very good (+2)	71	94	14	18
Good (+1)	84	69	22	26
Moderate (0)	48	32	20	25
Poor (-1)	25	18	4	5
Very poor (-2)	0	0	1	0
Extremely poor (-3)	0	1	0	0
Flavour score	+0.99	+1.31	+0.78	+0.77
No. of tasters	240	240	63	74

(Table 5) show clearly that the male presenter tended to select older tasters than the female presenter.

The results for the effect of supermarket location (Table 4) showed a small but consistent trend in that tasters in Northside (lower socio-economic class area) tended to give a higher rating to the tomato samples. The data (Table 4) show that female tasters outnumbered males by four to one in these tests.

Flavour score agreement—'groups of four'

The results (Table 6) show reasonable agreement within 'groups of four tasters'; however, in the July tests there were three 'groups of four' with the maximum divergence, i.e. one or more of the group giving the sample a (+3) and another (or more) giving a quarter of the same tomato a (-3) score for flavour. About two thirds of the 'groups of four' showed a range in score of 1 or 2 (Table 6).

Table 3 Tomato fruit composition, colour and firmness

	Test				
	Soluble solids (%)	Titratable acidity ¹	Electrical conductivity ² (μ S)	Colour (Hunter <i>a/b</i>)	Firmness ³ (N)
<i>July test date</i>					
Monocrop	4.7	8.28	553	0.96	29
Inter. system ⁴	4.7	8.24	567	1.00	27
F-test	NS	NS	NS	NS	$P < 0.05$
SE	0.06	0.12	13	0.02	0.47
<i>September test date</i>					
Monocrop	4.5	7.8	571	1.02	27
Inter. system ⁵	4.6	9.1	646	1.04	35
F-test	NS	$P < 0.001$	$P < 0.001$	NS	$P < 0.001$
SE	0.05	0.13	5.8	0.03	0.92

¹meq/100 ml puree.

²1 part puree + 9 parts distilled water.

³Firmness for 5 mm fruit compression.

⁴First crop of interplanted system.

⁵Second crop of interplanted system

Table 4 Influence of presenters (male vs female) and socio-economic class on supermarket taste panel scores¹ for tomato fruit

Factor	Test date	
	July	September
Male presenting samples	+1.59	+1.08
Female presenting samples	+1.22	+1.22
Northside (low socio-economic class area)	+1.45	+1.22
Sutton (high socio-economic class area)	+1.35	+1.08
No. of tasters—male	89	97
No. of tasters—female	391	383

¹See Table 2 for flavour categories; each figure is based on responses from 240 panellists

Table 5 Age classification of the tasters selected by the male and female presenting the samples

Age category (years)	Frequency (No. of tasters)			
	Male presenter		Female presenter	
	July	September	July	September
<20	13	14	29	46
20-29	14	25	31	34
30-39	38	55	60	59
40-49	84	85	86	66
50-59	61	37	23	24
>59	30	24	11	11

Table 6 Flavour score agreement between tasters in each 'group of four'

Range ¹ in the scores	Frequency (groups of four)	
	July	September
0	6	8
1	38	39
2	40	44
3	17	22
4	11	6
5	5	0
6	3	1
Total ²	120	120

¹Maximum is 6, i.e. +3 to -3.

²120 'groups of four'

Table 7 Tomato flavour score¹: 7-point scale vs line

Panel	7-point scale	Line
Supermarket	+1.38 (0.92) ²	+1.28 (1.36)
Laboratory	+0.75 (1.32)	+0.37 (1.33)

¹Single sample tasting; 120 tasters in the supermarket, i.e. 60 for each panel; 33 tasters were used in the first laboratory panel (7-point scale) and the same 33 in the second panel (line).

²Standard deviation

7-Point scale vs line scoring

The data (Table 7) show that the use of a line with fixed end points resulted in a lower tomato sample flavour score than a 7-point descriptive scale. Tasters in the supermarkets showed less tendency to use the end points of the 7-point scale as indicated by a lower standard deviation. As expected, the laboratory panel gave lower flavour scores than the supermarket tasters irrespective of the scoring system used.

Discussion

The finding that supermarket panels gave higher flavour ratings to tomato fruit than laboratory panels agrees with preliminary data from this laboratory (1) and also with those of Boegh-Sorensen (2) who found that panels carried out in households gave much higher flavour ratings to a series of meat products than a laboratory panel. These results suggest that absolute data for single sample hedonic tasting (at least for tomatoes) emanating from supermarket and laboratory panels are not directly comparable and highlight the dangers of extrapolating laboratory panel response into the market place. This result was expected as laboratory panels are likely to be more discerning than consumer type panels; similarly consumers from a higher socio-economic class area would also be expected to be more discerning than those from a lower class area—as was the case in the present study.

Further tests are needed to study the effect of the person presenting the samples on the consumer panel response as this aspect of the test was inconclusive in the present study. For example, is the response likely to be different if the samples are presented by a glamorous young female as against a middle aged male. The need for more careful planning and instruction in future tests regarding the selection of tasters of a more uniform age is highlighted by the data in Table 5 where the male presenter chose older people for the test.

The grouping of the tasters into 'fours' (i.e. four people tasted a quarter of the same tomato) proved useful as an indicator of the performance of the supermarket panellists and by and large there was good agreement within each group of four as to the flavour rating of the sample. However, the assumption was made that the four quarters of each fruit had the same composition.

No particular advantage was found in using a descriptive 7-point scale in comparison with a line (fixed end points) scale except that supermarket panellists showed less tendency to use the end points of the 7-point descriptive scale. The limitation that panellists tend not to use the end points of such scales has already been well established (6).

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