FINAL DRAFT: Consumer attitudes towards origin and organic - the role of credence labels on consumers' liking of tomatoes

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Summary

The tomato is one of the most popular vegetables in Europe, but since the introduction of modern production systems much attention has been paid to the issue 'lack of taste'. Consumers' experienced taste and quality, however, are not only dependent on attributes of the tomato such as taste and texture, but also on product appearance and labels signalling credence (*e.g.* origin and production method) and personal factors such as attitudes affecting consumers' quality experience. In this paper we hypothesise that credence labels (*i.e.* 'Swedish', 'Dutch' and 'Organic') have an effect on consumers' experienced liking of taste and total impression of tomatoes, and that attitudes towards those labels are correlated with experienced quality.

Through a taste assessment with a consumer panel, we found a significant difference in liking of taste between tomatoes labelled 'Dutch' (M=4.54, SD=1.68) and tomatoes

labelled ‘Swedish’ (M=5.88, SD=1.70) and ‘Organic’ (M=6.05, SD=1.70), respectively. As for overall impression, tomatoes labelled ‘Dutch’ (M=4.24, SD=1.74) received lower grades than ‘Swedish’ (M=5.59, SD=1.76) and ‘Organic’ (M=6.00, SD=1.63). We found that attitudes towards origin are significantly correlated with liking of taste of tomatoes labelled ‘Swedish’ in a positive direction and ‘Dutch’ in a negative direction. We also found that positive attitudes towards organic products are positively correlated with liking of tomatoes labelled ‘Organic’. The hypotheses are accepted and theoretical and practical implications are discussed.

Introduction

The tomato (*Lycopersicon esculentum* Mill.) is one of the most popular vegetables in the European Union with an average annual consumption of 12 kg per person and a total production of over 15 million tonnes (EUROSTAT 2008). While the Swedish tomato consumption has increased, the domestic market shares during the main production season (April-October) have fallen from 43 to 26% between 1998 and 2008, with imports coming mainly from the Netherlands (TJÄRNEMO et al. 2010). Less than 4% of the Swedish greenhouse tomato area consists of organic production (SWEDISH BOARD OF AGRICULTURE 2007). Although consumption increases, ‘lack of taste’ has become a reason for consumer dissatisfaction (BRUHN et al. 1991; FERNQVIST and HUNTER 2012), as the industry has been focusing on yields, resistance, product homogeneity, durability and a low price (FRIEDLAND 2006; EKELUND and JÖNSSON 2011).

Consumers’ quality perceptions can be based upon intrinsic or extrinsic attributes, or cues, of a product (OLSHAVSKY 1985) and consumer products have been categorised as search, experience, or credence goods based on different types of quality attributes available to the consumer (NELSON 1970; DARBY and KARNI 1973). Experience (*e.g.*

taste or satisfaction) and credence attributes (trust and beliefs) are transformed into search attributes often in the form of labels signalling for example nutritional value, food safety, ethics or trust (CASWELL and PADBERG 1992; CASWELL and MOJDUSZKA 1996). In a conceptual model of the consumer quality perception process (STEENKAMP 1990), judgements of perceived quality emerge in a contextual setting consisting of comparative, personal and situational factors, explaining how quality cues affect perceived quality through the intervening role of quality attributes. The Theory of Reasoned Action (FISHBEIN and AJZEN 1975) and the extended Theory of Planned Behaviour (AJZEN 1991) use attitudes and subjective norms to predict intended behaviour. An attitude can be described as a learned predisposition and based upon beliefs about the object. However, it does not predispose the person to perform a specific behaviour (FISHBEIN and AJZEN 1975), which is often referred to as the attitude-behaviour gap (VIERMIER and VERBEKE 2006). Using the framework of STEENKAMP (1990), we assume that attitudes (or the underlying beliefs) can be used to predict experienced quality of food. Labels signalling country of origin (COO) (DRANSFIELD et al. 2005; EKELUND, FERNQVIST and TJÄRNEMO 2007) and organic production (JOHANSSON et al. 1999; EKELUND, FERNQVIST and TJÄRNEMO 2007; GRANKVIST et al. 2007; POELMAN et al. 2008) have been shown to have strong effects on consumers' quality perceptions of food. In the case of Sweden, the national organic label 'KRAV' is known by 98% of the Swedish consumers (KRAV 2012), while the label of EU-organic is recognised by only 20% (ANDERSSON and EKELUND 2012). The purpose of this paper is to explore consumer attitudes towards two of the most common credence attributes connected to tomato - country of origin and organic production – thus focusing on the effect of different labels on consumers hedonic liking (taste) and overall impression of tomatoes. The Swedish KRAV-label is used as

77 the organic label, due to its strong signal value, and Swedish and Dutch are used as
78 labels of origin, due to them being the main competing countries of origin during the
79 Swedish production season. The alternatives, thus, represent those that the consumer
80 meets in an every-day shopping situation. Based on the theory of the quality
81 perception process (STEENKAMP 1990) we test the hypotheses that (a) labels signalling
82 credence attributes affect consumers' perceived taste (either positively or negatively),
83 and that (b) experienced taste and quality impression of labelled tomatoes are
84 correlated with positive (or negative) attitudes towards those labels, or what they
85 represent.

86 ## Material and Methods

87 The material consists of a consumer panel evaluation of tomatoes and a consumer
88 survey including background data of the respondents and a package of questions
89 regarding consumer attitudes. The assessments were made at a centralised location on
90 the campus of the Swedish University of Agricultural Sciences in Alnarp, and a
91 convenience sample was recruited from the general public and university staff and
92 students. In total 97 respondents, none of who were involved in vegetable production
93 or research, completed the tomato taste evaluation and questionnaire.

94 ***Consumer panel - questionnaire***

95 The consumers in the panel received a questionnaire including questions regarding a)
96 gender; b) age; c) consumption frequency; d) general satisfaction with purchased
97 tomatoes; and e) reasons for dissatisfaction with tomato purchases. Following the
98 usual supply in an ordinary supermarket during the Swedish season, the respondents
99 also marked; f) which type of tomato (*i.e.* 'on-the-vine', 'cherry and cocktail
100 varieties', 'single round', 'organic', 'plum varieties') they usually buy. The final part
101 of the questionnaire was a scheme of 17 attitude items (statements) to be graded on a

9-graded hedonic scale where the end-points were marked (1) totally disagree and (9) totally agree, comprising aspects like attitudes towards taste, appearance, colour, origin, production method, price and place of purchase. The specific questions are presented in the results section (Table 1).

Consumer panel - taste evaluation

Four tomatoes were part of the experiment evaluating the effects of different labels on hedonic liking. These were labelled 'Organic', 'Swedish' and 'Dutch', while a fourth (reference) tomato received a randomised three-digit number. The tomatoes were all of the same variety 'Arvento' (Rijk Zwaan); identical single round tomatoes harvested in the red ripening stage, collected from a local grower (WP-Grönt, Malmö) and stored for two days at room temperature (20°C). . In addition to these four tomatoes, the participants received four samples of another variety, so that identical tomatoes were not presented after each other. The tomatoes were tested in a design made up by two blocks consisting of A-D (four varieties not part of this experiment) and E-H (the four 'Arvento' tomatoes of the same origin, but with different labels), which were altered so that two tomatoes from the same block were never presented right after each other. The serving order was altered between six sessions to overcome order and learning effects and the probability of sensory fatigue. All tomatoes except the three tomatoes labelled 'Swedish', 'Dutch' and 'Organic (KRAV)' were given randomized three-digit numbers, which were different between the serving rounds. The tomatoes were served separately on paper plates marked with labels or number. Each panellist received a quarter of a tomato cut into three slices, and each tomato was judged separately. Parameters analysed are: (a) liking of the tomato taste; (b) overall impression of the tomato. The attributes were evaluated on a 9-point hedonic scale (LAWLESS and HEYMANN 2010). The panellists had a break between each serving

when they received water and unflavoured crackers to neutralise the taste. After the sensory evaluation, the respondents filled in the form with background and attitude questions.

Statistical analysis

Data were analysed with analysis of variance regarding tomato taste and overall impression, and correlations between taste and attitudes. Consumer survey questions regarding attitudes were analysed through principal component analysis (PCA). All analyses were made using SPSS.

Results

Consumer survey

Out of 97 respondents, 64% were female and 33% male. Mean age was 54 years, ranging between 19 and 80. 75% indicated that they consumed tomatoes three times a week or more. A majority of the consumers indicated that they were very satisfied (11%) or satisfied (70%) with their tomato purchases, while 18% were generally dissatisfied. 66% of the respondents indicated too little taste as the main reason for dissatisfaction, followed by 29% finding them to hard, 25% too expensive, 24% grainy in texture, 19% too soft, 19% they never ripen, and 9% bad appearance (the total response rate exceeds 100%, since the respondents could indicate up to three alternatives). Tomatoes ‘on-the-vine’ were the most frequently purchased type of tomato indicated by 48%, followed by cherry and cocktail varieties (24%), single round (21%), organic (13%) and plum varieties (5%) (up to two alternatives could be chosen).

Attitudes

The respondents graded 17 attitudinal questions on a hedonic scale between 1 (totally disagree) and 9 (totally agree) (Table 1). The grading for each item (statement) is grouped into three segments, where the lowest grades (1-3) indicate a negative attitude (disagree), the highest grades (7-9) indicate a positive attitude (agree), and the indications in between (4-6) represent 'neutral' answers or an indifferent attitude (Table 1). Out of the 97 respondents, 88 answered all the attitudinal questions, while the response rate on the individual attitudinal questions was between 90 and 94. The statement receiving the highest scores was 'good taste is important', with a mean of 8.46 and 96% indicating the highest grades, followed by positive attitudes towards local produce (M=7.48) and positive attitude towards Swedish produce (items N and O). The items A and B show that our respondents prefer sweet tomatoes to acidic ones. Item C shows that 60% find it important that the tomatoes are red at the time of purchasing and item G that 43% of the respondents find a nice and attractive appearance important. 53% of the respondents find that tomatoes from the open-air market taste better than those bought in the supermarket. The view on price differed between three groups of similar size. A new factor of consumer attitude towards Swedish, 'SWE', was created by the mean of the attributes concerning origin (H, N, O, and L, M with reversed scales), (M=6.91, with 57% indicating a strong positive attitude towards Swedish). Similarly, a new factor of consumer attitude towards Organic, 'ORG', was made by the mean of the factors concerning organic (I, P) (M=5.63, with 37% showing a strong positive attitude towards organic). The attitudinal data are illustrated in Table 1, where they are also divided into three sub-categories of origin, production method and hedonic and other statements. The items of the new factor 'SWE' show a Cronbach's alpha of 0.77, and the corresponding

174 factor for 'ORG' is 0.73, indicating reliable scales following the recommendations of
175 an alpha value above 0.7 (NUNALLY 1978).
176
177 Table 1 is inserted here
178
179 A principal component analysis (PCA) with Varimax rotation and Kaiser
180 Normalisation was made, to test if the 17 attitude statement items could be reduced to
181 a smaller set of dimensions. The outcome revealed six clearly distinguishable factors
182 with eigenvalues >1, explaining a cumulative 67.8% of the variance, as shown in
183 Table 2. The first factor (16.9% of variance explained) consisted of statements
184 concerning attitudes towards Swedish origin, local production and place of purchase
185 (items N, O, J, H, Q). The second factor (12.8%) concerned production method (items
186 E, I and P). Factors three (10.8%) and four (9.6%) contained items of hedonic
187 statements, price and appearance, while the fifth factor (9.0%) concerned attitudes
188 towards imports in relation to domestic produce. The last factor (8.7%) contained two
189 items concerning taste preferences; sweet and acidic taste. The analysis shows that,
190 similarly to what is presented in Table 1, attitudes concerning origin and production
191 method, respectively, are distinguishable from other attitude variables. Place of
192 purchase and attitude towards local production also seem to be related to domestic
193 origin.
194
195 Table 2 is inserted here
196

197 ***Taste evaluation***

198 The taste assessment was completed by 97 respondents and a one-way between-group
199 analysis showed a statistically significant difference in 'liking of taste' at the $p<0.05$
200 level in grading between the four tomatoes: F (3, 384)=15.9, p=0.000, with a
201 calculated eta square=0.11 showing a medium effect (COHEN 1988). Tukey HSD
202 indicated that the mean grade for the tomato labelled 'Dutch' (M=4.54, SD=1.68) was
203 significantly lower than for the tomatoes labelled 'Swedish' (M=5.88, SD=1.70),
204 'Organic' (M=6.05, SD=1.70) and the reference tomato (M=5.55, SD=1.61), whereas
205 there were no significant differences between the latter three (Table 3). There was a
206 significant difference in 'overall impression' at the $p<0.05$: F (3, 384)=18.0, p=0.000,
207 with an eta square=0.12, showing a medium, near large, effect (COHEN 1988). Tukey
208 HSD indicated that the mean grade for the tomato labelled 'Dutch (M=4.24, SD=1.74)
209 was significantly lower than for the tomatoes labelled 'Swedish' (M=5.65, SD=1.76),
210 'Organic' (M=6.00, SD=1.63) and the reference tomato (M=5.34, SD=1.86). The
211 tomato labelled 'Organic' also received significantly higher grades than the reference
212 tomato, but not than the tomato labelled 'Swedish' (Table 3). The results show that
213 we can accept our first hypothesis, that credence attributes affect taste experiences,
214 but with no difference between the two attributes Swedish and Organic.

215 ***Correlating taste with attitudes***

216 Our second hypothesis was that a positive attitude towards credence attributes (*i.e.*
217 country-of-origin and organic) is positively correlated with liking for tomatoes
218 labelled 'Swedish' and 'Organic' as compared with unlabelled tomatoes or tomatoes
219 labelled 'Dutch'. To test this hypothesis we made correlations between the new
220 factors of attitude towards Swedish, 'SWE', and attitude towards organic, 'ORG', and
221 the results of experienced taste and overall impression in our taste assessment. The

results (Table 3) show a significant correlation between attitude towards Swedish and liking of taste of tomatoes labelled 'Swedish' and labelled 'Organic' on the 0.05-level. The attitude towards Swedish and the experienced overall impression were significantly and positively correlated with the tomatoes labelled 'Swedish' and labelled 'Organic' at the 0.01-level, and negatively correlated with the tomato labelled 'Dutch' at the 0.05-level. The strength in these cases is below 0.3, indicating a weak correlation. In one case, the organic label concerning overall impression, the r-value is between 0.3 and 0.5 (0.35), indicating a moderate correlation. The combined factor of attitude towards organic 'ORG' is positively correlated with experienced liking of taste, and overall impression of tomatoes labelled 'organic' at the 0.01-level (Table 3). In all cases, the strength of the relationships is weak, with an r-value below 0.3.

Table 3 is inserted here

Discussion

Our results show that tomato taste is a major concern, as previously described by FERNQVIST and HUNTER (2012). When asked to evaluate statements, a majority of the respondents found 'Swedish' tomatoes tastier than 'imports', and 'organic' tastier than conventional. A majority, 57%, showed a strong positive attitude towards 'Swedish', while 37% showed a strong positive attitude towards 'organic'. 'Imports' was considered more negative. In the taste assessment, tomatoes with a 'Dutch' label received significantly lower grades than unlabelled reference tomatoes and tomatoes labelled 'Swedish'. This indicates a negative COO-effect of imports compared with domestic, which is also the case in many other countries (VERLEGH, STEENKAMP and MEULENBERG 2005). Also in previous taste evaluations carried out in 1994, 1995 and 2004, Swedish consumers ranked tomatoes labelled 'Swedish' higher than identical tomatoes with other COO labels. Imported tomatoes were considered inferior while

247 there was little perceived taste difference between ‘Swedish’ and ‘organic’ (EKELUND
248 1996; EKELUND, FERNQVIST and TJÄRNEMO 2007; KLINTMAN et al. 2008). The
249 negative experienced taste due to a Dutch label seems to be constant over time, but
250 has apparently not impeded the increase of Dutch imports. In a real shopping
251 situation, there are no ‘anonymous’ tomatoes, since EU regulations state that country
252 of origin must be presented at point-of-purchase (SWEDISH BOARD OF AGRICULTURE
253 2012). Nearly a third of our consumers indicated that they strongly agree with the
254 statement that organic tomatoes taste better than conventional ones, and the tomatoes
255 labelled ‘Organic’ received the highest score for taste. The ‘organic’ consumers, the
256 frequent buyers of organic tomatoes, were 13% of the respondents, while at the same
257 time 37% had strongly positive attitudes towards organic produce. The result confirms
258 the gap between positive attitudes towards organic and behaviour as discussed by
259 VERMEIR and VERBEKE (2006).
260 Even though our correlations between liking and attitudes were weak, our analysis
261 showed that positive attitudes towards Swedish are positively correlated with
262 experienced taste and overall impression of the tomato labelled ‘Swedish’. It also
263 showed a negative correlation with the tomato labelled ‘Dutch’ concerning the overall
264 impression. Positive attitudes towards organic were positively correlated with both
265 ’liking of taste’ and ’overall impression’ of tomatoes labelled ‘Organic’, but not with
266 taste and impression regarding the tomatoes labelled ’Swedish’, ’Dutch’ or the
267 reference tomato. POELMAN et al. (2008) showed similar results by exploring the
268 influence of information of organic production and fair trade on hedonic and analytic
269 judgements. Also positive attitudes towards Swedish are correlated with a positive
270 taste and overall impression of tomatoes labelled ‘Organic’. This suggest that there is
271 a general belief among consumers that ‘organic tastes better’, not only specific for

heavy organic consumers, or consumers with a strong positive attitude towards organic. LEA and WORSLEY (2005) showed that a majority of consumers believed organic food tastes better than conventional food, and taste has been shown, among food safety and health, to be the primary motive for buying organic (MCEACHERN and MCCLEAN 2002). However, the most frequently purchased type of tomato among our respondents is 'on-the-vine' tomato, a type not commonly produced in Sweden, but imported from the Netherlands. Thus, if the preference for 'on-the-vine' is stronger than for Swedish, consumers will choose the Dutch products. Nearly two thirds of our respondents strongly agree that 'on-the-vine' tastes better than ordinary single round, which could indicate that the type of tomato is more important than origin. Further studies are recommended, as we have a limited sample size of consumers not representing a national average and the assessment was carried out in the main tomato production district. Further, the study focused on taste and labels and not a real-life purchasing situation, where size, shape, price and other search attributes are available and where tomatoes may carry more than one type of credence attribute (*e.g.* brands, health labels, certifications) and taste may vary between varieties and types.

The results indicate that taste is a major concern among the consumers and that two of the major credence attributes of tomatoes signalled through labels have an effect on perceived taste and quality. The findings strengthen the theory that perceived quality is affected by personal factors such as attitudes. Our hypotheses that credence labels affect perceived taste and that experienced taste and overall quality impression are correlated with the attitudes towards those labels, are accepted. Strong COO-effects on consumer liking of food have previously been shown, and this evidence is strengthened by our results. From a marketing perspective, as diversification on the tomato market has evolved at an increasing speed, and competition similarly become

stronger, the actors are forced to strengthen their competiveness and market position. An organic consumer segment has been identified, suggesting that diversification to satisfy consumers with different preferences may be a market strategy. Clear signalling of origin, and taste, in accordance with consumers' positive attitudes towards domestic produce is another way to position against bulk tomatoes. Thus, the findings may have implications for the industry and marketers.

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384 Table legends

385 Table 1. Statements and consumer attitudes (graded from 1-totally disagree to 9-
386 totally agree) grouped on categories.

387

388 Table 2. SPSS Principal Component Analyis with Varimax Rotation. Consumer
389 attitude items and factor loadings.

390

391 Table 3. Consumer assessment. Experienced taste and overall impression of labelled
392 tomatoes and the relationship between attitudes towards Swedish and organic and
393 liking of assessed tomatoes.

394 Table 1.

Item	Statement	Valid N	Mean	Std. Dev.	Segments[c]		
					Disagree (negative towards statement (1-3)	Neutral (4-6)	Agree (positive towards statement) (7-9)
Origin related statements							
H	Swedish tomatoes taste better than imported	92	6.38	2.45	15%	28%	57%
J	Tomatoes from the open air market taste better than from the supermarket	91	6.16	2.12	15%	32%	53%
L	I prefer imported tomatoes to Swedish ones	91	2.58	1.94	67%	30%	3%
M	There is no taste difference between Swedish and imported	90	3.91	2.16	42%	46%	11%
N	I primarily choose Swedish tomatoes if I can	91	7.18	2.24	11%	20%	69%
O	It is important to buy Swedish	91	7.43	2.04	9%	13%	78%
SWE[a)]	Attitude towards Swedish	89	6.91	1.56	5%	38%	57%
Production method related statements							
E	It is important that I know the production method	93	6.28	2.36	16%	28%	56%
I	Organic tomatoes taste better than conventional	92	5.21	2.37	22%	48%	30%
P	It is important to buy organic	91	6.07	2.46	15%	37%	47%
ORG[b)]	Attitude towards Organic	89	5.63	2.16	17%	46%	37%
Hedonic and other statements							
A	I prefer sweet tomatoes	92	6.99	1.59	3%	27%	70%
B	I prefer acidic tomatoes	91	4.30	2.18	42%	42%	16%
C	It is important that the tomatoes are fully red when I buy	93	6.45	2.15	13%	27%	60%
D	A low price is important	93	4.66	2.21	32%	41%	27%
F	Good taste is important	94	8.46	1.09	1%	3%	96%
G	A nice and attractive appearance is important	93	5.46	2.45	26%	31%	43%
K	Tomatoes 'on-the-vine' taste better than 'ordinary'	91	6.63	2.07	9%	33%	58%
Q	It is important to buy local	91	7.48	1.96	8%	14%	78%

395 [a)] The new item SWE consist of the items H, L (reversed scale), M (reversed scale), N and O.

396 [b)] The new item ORG consist of the items, I and P.

397 [c)] Rounded percentages are used.

398

399 Table 2.

Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
N. I primarily choose Swedish tomatoes if I can	.75					
O. It is important to buy Swedish	.72					
J. Tomatoes from the open air market taste better than from the supermarket	.71					
H. Swedish tomatoes taste better than imported	.69					
Q. It is important to buy local	.42					
I. Organic tomatoes taste better than conventional		.83				
P. It is important to buy organic		.80				
E. It is important that I know the production method		.55				
K Tomatoes 'on-the-vine' taste better than 'ordinary'			.78			
F. A Good taste is important			.64			
C. It is important that the tomatoes are fully red when I buy			.59			
D. A low price is important				.77		
G. A nice and attractive appearance is important				.71		
M. There is no taste difference between Swedish and imported					.77	
L. I prefer imported tomatoes to Swedish ones					.67	
B. I prefer acidic tomatoes						,80
A. I prefer sweet tomatoes						.78
Variance explained by the factor	16.92	12.78	10.84	9.64	8.97	8.68
Cumulative variance explained	16.92	29.70	40.55	50.19	59.17	67.84

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402 Table 3.

Dependent variable in consumer assessment	Tomato label	Mean grade on a hedonic scale (1-9)[a]	Correlation with preferences [b]	
			Attitude towards Swedish 'SWE' (Mean=6.91, N=89)	Attitude towards Organic 'ORG' (Mean=5.63, N=89)
Liking of taste	Dutch	4.54a	-.206	-.123
	Reference	5.55b	.170	-.034
	Swedish	5.88b	**.263***	.045
	Organic	6.05b	**.258***	.**288****
Overall impression	Dutch	4.24a	**-.236***	-.123
	Reference	5.34b	.094	-.079
	Swedish	5.65bc	**.296****	-.060
	Organic	6.00c	**.350****	.**276****

403 [a)] Different letters indicate a significant difference P<0.05.

404 [b)] *: Correlation is significant at the 0.05 level (2-tailed); **: Correlation is significant

405 at the 0.01 level (2-tailed).

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