ACCEPTABILITY OF YOGHURT AND YOGHURT-LIKE PRODUCTS. INFLUENCE OF PRODUCT INFORMATION AND CONSUMER CHARACTERISTICS AND PREFERENCES

SARA BAYARRI, INMACULADA CARBONELL, EDITH X. BARRIOS and ELVIRA COSTELL[1]

Instituto de Agroquímica y Tecnología de Alimentos (CSIC)
P.O. Box 73, 46100
Burjassot, Valencia
Spain

[1] Corresponding author. TEL: +34 963 900022; FAX: +34 963 636301; E-MAIL: ecostell@iata.csic.es

ABSTRACT

This work aims to investigate whether the information about product type and the nutritional label affects consumer acceptability of yoghurt and fermented milk. Hedonic evaluations of seven commercial samples, three yoghurts and four fermented milks were elicited from 120 consumers under blind tasting conditions, looking at a card with the product type and with the label nutritional facts and finally, tasting labeled products. For the whole group of consumers, nutritional information did not affect the acceptability of these products although analysis of individual consumer behavior showed that only for around 50% of consumers surveyed, this result reflects on their actual response. When data for subgroups of consumers of different gender or age or with different preference pattern were considered, differences in the influence of nutritional information on samples acceptability were detected. These results confirm that the data averaged from the consumer whole population can not accurately reflect the real behavior of the population surveyed. More complete and valid information can be gained from analyzing the responses of the consumer subgroups of different characteristics or with different individual preferences.

Practical Applications

Currently there are a lot of new dairy products with different sensory and nutritional characteristics on the market. Confirmation or disconfirmation of the expectations generated by the nutritional information plays an important role in consumers' acceptance of these products. The results of this work provide information about the different conclusions that can be drawn when one considers average acceptance data for the whole population of consumers or average data of consumer subgroups (i.e. different gender, age or individual preferences).

Keywords: yoghurt, fermented milk, consumer response, expectations, acceptability, nutritional information

INTRODUCTION

Growing interest in healthy eating has given rise to a new range of foods and products on the market that, as well as providing nourishment, improve health by increasing well-being and reducing the risk of certain diseases. The present importance of functional foods on the market is variable and difficult to determine, but it is clear that they have a high growth potential (Sloan 2006). Among the different product sectors, the dairy sector is the one which has undergone greatest change, with the introduction of new products claiming healthy characteristics. In recent years, traditional products like skimmed dairy products or those with probiotic characteristics like yoghurt have expanded to incorporate an ample range of fermented milk of pre- or probiotic nature, and yogurts and milk with different active ingredients that offer the consumer an alternative to conventional dairy products. The criteria a consumer follows when choosing a product can not always be explained by the differences perceived in sensorial quality. In addition to the characteristics of the food itself and the sensations the consumer experiences when ingesting it, there are other influential factors, such as the opinion each consumer has of the nutritional characteristics or composition of the product (Bruhn *et al*. 1992), its safety (Wilcock *et al*. 2004) and, even, its trade name or price (Guerrero *et al*. 2000; Caporale and Monteleone 2001; Di Monaco *et al*. 2005). All these factors can influence their choice at the moment of purchase and modify the degree of pleasure they experience when consuming it. In principle, to understand and predict the market response to a novel food it is necessary to jointly analyze the impact that its sensory quality has and the attitudes, opinions and expectations that consumers have of the product in question (Heldman 2004; Urala and Lähtennmäki 2004; Verbeke *et al*. 2005; Verbeke 2006).

Consumers' expectations of either sensory or hedonic characteristics can be generated by a variety of factors and play an important role in food selection and consumption. Subsequent confirmation or disconfirmation can lead to either repeated consumption or rejection of a product. With respect to food acceptance, the key question is how the confirmation or disconfirmation of these expectations affects food acceptance (Cardello 1994). Four models, based on four psychological theories, can be used to explain how disconfirmation created by expectations may influence product acceptance: Assimilation, Contrast, Generalized negativity and Assimilation-contrast (Cardello and Sawyer 1992; Tuorila *et al*. 1994; Deliza and MacFie 1996; Newsholme and Wong

2001). The assimilation model predicts that regardless of whether positive or negative disconfirmation occurs, any discrepancy between expectation and liking of a product is assimilated by the consumer and the actual liking moves in the direction of expected liking. The contrast model supposes the opposite to the assimilation model and predicts that actual liking moves in the opposite direction to expected liking. The generalized negativity model predicts that product acceptance decreases when any type of disconfirmation between expectations and acceptance occurs. The assimilation–contrast model is a combination of both the assimilation and the contrast models and it is based on certain limits to acceptance or rejection of a product by consumers. According to Cardello (1994) this model predicts that assimilation will occur when the acceptance of the product differs only slightly to moderately from expectations; however, when the acceptance differs significantly from expectations then a contrast effect occurs. Among these four models, the assimilation and the contrast models are those that usually better predict the consumer response under conditions of positive or negative disconfirmation (Mialon *et al.* 2002; Di Monaco *et al.* 2004; Napolitano *et al.* 2007; Behrens *et al.* 2007; Villegas *et al.* 2008). Thus, Siret and Issanchou (2000) analyzed how information given about the production method of pâté (traditional and non-traditional) influenced its acceptability, while Jaeger and MacFie (2001) explored how images and prior information affected the acceptance of different varieties of apple. In the case of functional foods, it is logical to think that information on their potential influence on health may affect their acceptance. However, this is not always so. Shepperd *et al.* (1991/92) noted that information on the fat and sugar content did not influence the acceptance of milk beverages. A similar result was obtained by Kähkönen *et al.* (1997) on analyzing the effect of information on the acceptance of non-fat strawberry yoghurt. When the study was conducted with other types of products, sausages and chocolate, the information given increased acceptance of the sausage, but did not influence acceptance of the chocolate (Kähkönen *et al.* 1999). Roosen *et al.* (2007) studied the effect of product health information on consumers' liking and choice of two canned fish (tuna and sardines). They observed that while information influenced consumer preferences as revealed by their choice procedure, the impact of information on hedonic scores was relatively weak. Behrens *et al.* (2007) did not detect differences in acceptability of four types of yoghurt-like fermented soymilk between the overall liking rated under blind testing and when the samples were rated with the corresponding nutrition and health claims available. In general should be considered that the nutritional information exerts

120 a weaker influence than expected on acceptance of food products. In most of these
121 works, conclusions were based on data averaged from the consumer whole population
122 surveyed. Moreover when analyzing the results obtained from a consumer group, an
123 interesting question to consider is whether or not all consumers have responded to the
124 information provided in the same way. Differences in consumers´ responses may be due
125 to different reasons, such as a lack of confidence in the information received or an
126 interpretation in terms of attitudes and beliefs (Cardello and Sawyer 1992); sensory
127 preferences or personal opinions on health and nutrition (Shepherd *et al.* 1991/92); or,
128 certain personal traits (Deliza *et al.* 1996).
129
130 The main objective of this work is to investigate whether the information about product
131 type and nutritional facts affect consumer acceptability of yoghurt and fermented milk
132 and to what extent consumers' demographic characteristics and their individual sensory
133 preferences influence their response to the nutritional information.
134
135 **MATERIAL AND METHODS**
136
137 **Subjects**
138 Subjects were recruited by a local consumer association (Asociación Valenciana de
139 Consumidores y Usuarios, AVACU) through a short questionnaire sent by mail. The
140 participants were selected according to the following criteria: age, gender and
141 consumers of yoghurt (minimum intake of one a week). One hundred and twenty
142 participants were selected. Prior to the test, it was confirmed that participants had no
143 allergies to milk or dairy products. All of them completed the experimental sessions.
144
145 **Samples**
146 Seven commercial samples, three of natural yoghurt (Y1, Y2 and Y3) and the other four
147 natural fermented milk with weak gellified structure (FM1, FM2, FM3, FM4), of
148 different brands and characteristics, were selected (Table 1). The selection criterion was
149 based on analysis of product range and identification of leading market brands. The
150 samples were purchased from the local market taking into account the sell-by dates (the
151 same for each brand) and were stored at 5 ± 1ºC prior to testing. All evaluations were
152 performed within the declared shelf-life period of each sample.
153

Consumer test

The study was carried out in three consecutive sessions, with a 15m rest period between sessions, in a standardized test room (ISO, 2007) in the morning (11:00-13:00) or afternoon (15:30-17:00). At the beginning of the first session consumers were given a brief overview of how the sensory test would be conducted and they filled in a questionnaire about their demographic and sociological characteristics (Table 2), about their habits concerning dairy product consumption (Table 3) and about their purchase intention with respect to some well-known categories of functional dairy products (Figure 1).

In the first session, the seven samples without information were presented (blind condition, B) for the 120 participants to evaluate their overall acceptability using a 9-point hedonic scale ranging from 1 ("dislike extremely") to 9 ("like extremely"). In the second session, participants were provided with cards giving information about the products. The cards contained information taken from the commercial packages about product type (yoghurt or fermented milk) and some nutritional facts (compositional details, energetic value and fat content) (Table 1). The participants were asked to read the cards and to rate, also using the 9-point hedonic scale, how acceptable they expected the product to be (expected condition, E). Finally, in the third session, the subjects were simultaneously given the card and the corresponding product to be tasted (informed condition, I). The rating procedure was the same as in the previous stages.

The samples or the information cards were coded with random three-digit numbers. Samples (15g) were served at 6 ± 1ºC in white plastic cups and mineral water was provided for mouth-rinsing. To avoid first position distortions and possible carryover effects, the presentation order followed a Williams design for seven samples (MacFie *et al.*1989) within each of the three conditions. Each sample, card or card+sample was presented monadically with a 30s interval between evaluations. Data acquisition was performed using Compusense® five release 4.6 software (Compusense Inc., Guelph, Ontario, Canada).

Data analysis

Two-way ANOVA was performed on acceptability data within each evaluation condition (blind, informed and expected) with sample and consumer being sources of variation. These analyses were carried out for data obtained from the whole group of consumers and from each of the subgroups of consumers formed according to their

188 demographic characteristics (gender and age) and to their similar hedonic response.
189 Significance of differences between samples was determined by the Fisher test ($p \leq$
190 0.05). Student's t-tests ($p \leq 0.05$) were carried out to detect the significance of
191 differences between expected and blind (E-B); informed and blind (I-B) and informed
192 and expected (I-E) conditions for each sample. Also in this case, the analyses were
193 carried out for data obtained from the whole group of consumers and from each of the
194 subgroups of consumers. To study the proportion of consumers showing assimilation,
195 contrast or not effect of expectations generated by information on samples acceptability,
196 the relationship between I-B and E-B values for each sample and for each consumer was
197 calculated. An assimilation effect was revealed when (I-B)/(E-B)>0 and a contrast
198 effect when (I-B)/(E-B)<0. All of these analyses were performed by XLSTAT-Pro
199 software v. 2007 (Addinsoft, France).
200 To identify possible consumer subgroups with different preference patterns, the matrix
201 of individual acceptability scores obtained under blind condition evaluation across the
202 seven samples was analyzed by internal preference mapping using Senstools v. 3.3.2
203 (OP&P & Talcott, Utrecht, The Netherlands). The subgroups of consumers with
204 different preference patterns were established according to the position of the end of
205 each consumer's acceptance vector respect to the quadrants defined by the first two axes
206 of the internal preference map obtained and considering as different subgroups the
207 consumers represented in each quadrant (Greenhoff and MacFie 1994)
208
209 **RESULTS AND DISCUSSION**
210
211 **Effect of information-generated expectations on sample acceptability**
212 To analyze the extent to which sample acceptability for the whole consumer population
213 was influenced by the expectations generated by the information about product type and
214 nutritional facts, the mean scores were calculated. For each sample, average
215 acceptability score in the blind condition (B), in the expected condition (E) and in the
216 informed condition (I) were obtained (Table 4). In general, the expected acceptability of
217 samples was good, with mean scores above 5.7, without detectable differences
218 attributed to product type, i.e., yoghurt or fermented milk. The sugar-sweetened semi-
219 skimmed natural yoghurts (samples Y1 and Y2) were expected to be the most
220 acceptable among the samples evaluated. The samples expected to be least acceptable
221 were the two skimmed samples (Y3 and FM2) and the fermented milk with the

222 bacterium *Lactobacillus casei* (FM4). Expected minus blind scores (E-B) can be
223 considered to represent the measure of hedonic disconfirmation. Paired t-tests were
224 carried out to test significant differences between the expected and blind acceptability
225 ratings (Table 4). According to the data obtained, no significant differences were
226 detected for two samples: Y1 and FM4. These products were as acceptable as expected.
227 A negative disconfirmation (product less acceptable than expected) occurred in the
228 evaluation of samples FM1 and FM2 while a positive disconfirmation (product more
229 acceptable than expected) occurred for samples Y2, Y3, and FM3. To analyze the
230 influence of disconfirmation on sample acceptability, informed minus blind scores (I-B)
231 were calculated and paired t-tests were carried out to assess significant differences
232 between them. No significant differences were detected for all seven samples (Table 4).
233 This fact would indicate that considering the data of all the consumers surveyed,
234 nutritional and product information supplied do not influence acceptability of either
235 type of product, yoghurt or fermented milk. These results are in accordance with those
236 obtained by Kähkönen *et al.* (1997) concerning the effect of nutritional claims on
237 hedonic responses to fat-free strawberry yoghurt. They observed that the acceptability
238 of well-liked yoghurt was not significantly affected by fat-related information and
239 concluded that the relatively high pleasantness of the yoghurt may have prevented the
240 consumers from processing information about the sample. Perhaps this attitude was
241 founded on the fact that yoghurt is a familiar product for consumers and the belief that it
242 is beneficial to health is wide-spread (Kähkönen *et al.* 1997; Newsholme 2002; Barrios
243 *et al.* 2008).
244 When individual consumer responses were studied, differences in consumer behavior
245 were observed for all samples (Table 5). Assimilation (i.e. when the liking of a product
246 moves in the direction of expectations) and contrast (i.e. when the liking of a product
247 moves in the opposite direction to expectations) models were considered in order to
248 explain how disconfirmation created by information-generated expectations may
249 influence product acceptance. The percentage of assimilation varies from 32.5%
250 (sample FM3) to 49.2% (sample Y1). The contrast effect was observed in a lower
251 percentage of individuals, below 10%, and was slightly more noticeable for samples
252 FM1 and FM2 (10 and 15%, respectively). These results were in accordance with
253 previous food studies, which report that the main effect exerted by information on
254 acceptability could be explained by the assimilation model in the presence of both
255 positive and negative disconfirmations (Caporale and Monteleone 2001; Lange *et al.*

1999; Schifferstein *et al.* 1999; Tuorila *et al.* 1994; Cardello and Sawyer 1992; Villegas *et al.* 2008). Finally, the percentage of consumers that were not influenced by the information or whose response did not follow a clear model was considerable (43-61%) (Table 5). A similar result was obtained by Behrens *et al.* (2007) on analyzing the individual consumer responses to nutrition and health claims in soymilk products. They concluded that the percentage of consumers either uninfluenced by the information or whose response did not follow a clear model, ranged from 55.4 to 74.5%. This leads us two conclusions: a) the differences between mean acceptability values obtained in the blind, in the expected and in the informed condition for the whole population can not accurately reflect the real behavior of the consumer population surveyed and b) analyzing responses of the different subgroups of consumers can afford more complete information about the actual influence of information on acceptability.

Influence of demographic consumer characteristics (gender and age) on how information-generated expectations affect acceptability

There were no important differences between men and women with respect to the expected acceptability of samples (Table 6). Both subgroups showed a similar trend and it coincides with that observed for the whole group of consumers. The samples expected to be most acceptable were Y1 and Y2 and those expected to be least acceptable were samples Y3, FM2 and FM4. Hedonic disconfirmation was higher for women than for men. Not significant differences were detected for four samples (Y1, Y2, FM2 and FM4). For men all of these samples were as acceptable as expected. For the remaining samples, a negative disconfirmation occurred for sample FM1 and a positive disconfirmation occurred for samples Y3 and FM3 (Table 6). For women, the data obtained were similar to those obtained for the whole population of consumers. Only two samples (Y1 and FM4) were as acceptable as expected; a negative disconfirmation occurred for samples FM1 and FM2 and a positive disconfirmation occurred for samples Y2, Y3, and FM3 (Table 6). Another difference between these two subgroups of consumers was linked to the influence of the disconfirmation on acceptability of the skimmed yoghurt (sample Y3). For men, the disconfirmation did not influence sample acceptability and the difference between acceptability on informed and blind conditions was not significant. For women, disconfirmation influenced sample acceptability and the difference between acceptability on informed and blind conditions was significant ($p< 0.01$) (Table 6). This result was in accordance with the idea that women tend to be

more concerned about health issues (Verbeke 2005). In this case, the main effect exerted by information on acceptability of sample Y3 for women could be explained by the assimilation model. Informed minus expected scores (I-E) were also calculated (Table 6). A significant difference between informed and expected scores indicates that the women had not fully assimilated the information (Lange *et al.* 1999; Siret and Issanchou 2000) and both the sensory hedonic dimension and expectations had an impact on the informed acceptability score of the skimmed yoghurt sample.

As far as age was concerned, the different age subgroups (Table 7) showed a similar trend which coincided with that observed for the whole group of consumers and for the gender groups (Tables 4 and 6). Differences among the age groups were detected on signification of expected minus blind scores (E-B). The number of samples corresponding to hedonic disconfirmation increased with consumer age (from the youngest to the oldest). Moreover, disconfirmation influenced sample acceptability in two cases. For the youngest consumers (18-30 years) information only affected acceptability of a fermented milk sample (FM3). Although their response followed the assimilation model, this assimilation was not complete. For the oldest consumers (≥ 45 years) the information only influenced acceptability in sample Y2 and, thus, assimilation was complete (Table 7). For the latter sample, the difference between informed and expected scores was not significant, from which one can conclude that information-generated expectations exerted the strongest influence on the informed acceptability score. For consumers aged from 31 to 45 years, the nutritional and product information supplied did not influence acceptability for either type of product - yoghurt or fermented milk.

Influence of individual preferences on the effect of information-generated expectations on acceptability

To obtain information about individual consumer preference, as well as to identify consumer groups with different preference patterns, the matrix of individual acceptability scores obtained in the blind condition across the seven samples was analyzed by internal preference mapping. The amount of variance explained by the first two dimensions was 63 % and the preference space defined by these dimensions is shown in Figure 2. This space represents the consensus configuration of the seven samples based on the acceptability data (Greenhoff and MacFie 1994; Costell *et al*. 2000). Points showing the preference direction for each consumer fell mainly in the

region of negative scores in dimension one. Eighty-seven percent (87 %) of consumers are located in the left-hand side of the map, constituting the two largest subgroups in terms of their position in the upper part (subgroup I, n = 57) or at the bottom of the diagram (subgroup II, n = 48). Differences in average acceptability scores of the seven samples for the two consumer subgroups show their different preference patterns (Figure 3). The largest difference in acceptability between both consumer subgroups corresponds to fermented milk FM1, which is considered acceptable by subgroup 1 (average score = 5.33) and unacceptable by subgroup 2 (average score = 3.42). Differences in acceptability of sample Y1 and of sample FM4 between the two subgroups of consumers were also detected. For the remaining samples lower differences in acceptability were observed (Figure 3).

In order to simplify the analysis of the influence of individual preferences on the effect that information has on acceptability of samples (Table 8) only data corresponding to Y1, FM1 and FM4 samples are commented. The expected acceptability of these three samples was similar for both subgroups of consumers, and samples Y1 and FM1 were expected to be slightly more acceptable than sample FM4. For consumer subgroup I, a negative disconfirmation occurred for these three samples and the information about product type and about nutritional facts of the samples affects their acceptability. For all of them average acceptability scores under blind conditions were significantly lower than those obtained for the expected condition and differences between acceptability under informed and blind conditions were also significant, although consumer response did not follow the same trend for all three samples (Table 8). Consumer response followed a complete assimilation model for samples Y1 and FM4 and a contrast model for sample FM1. For the two first samples, acceptability moved in the same direction as expectations and for the last sample, it moved in the opposite direction to expectations. For consumer subgroup II, a positive disconfirmation occurred for samples Y1 and FM4 and a negative disconfirmation occurred for sample FM1. For this subgroup of consumers, acceptability of all three samples moved in the same direction as expectations and their response followed an assimilation model, which was complete for sample Y1 and incomplete for samples FM1 and FM4.

CONCLUSIONS

Considering the average data for all the consumers surveyed, we conclude that nutritional and product information supplied do not influence acceptability of either type of product, yoghurt or fermented milk. Analysis of individual consumer behavior showed that only for around 50% of consumers surveyed, this result reflects on their actual response. However, when one considers data for subgroups of consumers of different gender or different age or with different preferences, other conclusions can be drawn. The number of samples with hedonic disconfirmation was higher in women than in men and increased from the youngest to the oldest consumers. Differences in the influence of disconfirmation on acceptability for some samples were detected for both women and men and for different age groups. The greatest difference in consumer response to sample information was observed between the subgroups of consumers with different preference patterns. These results confirm that the influence of nutritional information on acceptance also depends on the sensory quality of products as well as on consumer preference.

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374

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TABLE 1.
MAIN INGREDIENTS AND NUTRITIONAL FACTS OF COMMERCIAL YOGHURT AND FERMENTED MILK SAMPLES[*†]

Sample	**Main ingredients**	**Energetic value** (Kcal/100g)	**Fat content** (g/100g)	**Protein content** (g/100g)	**Carbohydrate content** (g/100g)	**Calcium content** (mg/100g)
Y1	Semi-skimmed milk, sugar, lactic ferments, with calcium	87	1.8	3.2	14.4	96
Y2	Semi-skimmed milk, sugar, lactic ferments	86	1.9	3.1	13.4	127
Y3	Skimmed milk, sweeteners, lactic ferments	40	2.1	4.3	5.2	140
FM1	Semi-skimmed milk, lactic ferments, *bifidobacteria*	57	0.1	4.0	5.0	150
FM2	Skimmed milk, lactic ferments, *bifidobacteria*	46	0.4	4.4	5.5	163
FM3	Milk, sugar, apple, cereals, dietary fiber (1.2%), lactic ferments, *bifidobacteria*	102	3.2	4.0	14.3	143
FM4	Milk, sugar, lactic ferments, *Lactobacillus casei*	86	2.9	3.8	11.1	116

[*]Declared in label.
[†]Y1, Y2 and Y3: natural yoghurt samples; and FM1, FM2, FM3, FM4: natural fermented milk samples with yoghurt-like structure.

TABLE 2.
DEMOGRAPHIC AND SOCIOLOGICAL CHARACTERISTICS OF CONSUMERS (N = 120)

Characteristics	**Category**	**Number of consumers**	**Percentage (%)**
Gender	Women	72	60.0
	Men	48	38.8
Age group	18-30	54	45.0
	31-45	35	29.2
	>45	31	25.8
Marital status	Single	61	50.8
	Married	49	40.9
	Others	10	8.3
Occupation	Employee	75	62.5
	Student	28	23.3
	Housewife	7	5.8
	Unemployed	10	8.4
Education	University degree	67	55.8
	Not university degree	53	44.2

TABLE 3.
CONSUMPTION HABITS OF DIFFERENT TYPES OF MILK, YOGHURTS AND FERMENTED MILKS TO THE SURVEYED CONSUMER POPULATION (N = 120)

Product	**Sometimes per week (%)**	**Once per week (%)**	**Less at once per week (%)**	**Never (%)**
Whole milk	25.8	3.3	20.8	50.0
Semi-skimmed milk	46.7	1.7	13.3	38.3
Skimmed milk	28.3	1.7	10.8	59.2
Yoghurt	69.2	10.8	9.2	10.8
Skimmed yoghurt	31.7	10.0	24.2	34.2
Fermented milk	25.0	8.3	37.5	28.3

TABLE 4.
OVERALL ACCEPTABILITY MEAN VALUES OF SAMPLES EVALUATED UNDER BLIND, EXPECTED AND INFORMED CONDITIONS BY CONSUMERS (N=120). DIFFERENCES (D) BETWEEN THE MEAN RATINGS AND CORRESPONDING PROBABILITIES (*p*) TESTED THROUGH PAIRED t-TEST [*†]

Sample	Blind (B)	Expected (E)	Informed (I)	(E-B) D	(E-B) *p*	(I-B) D	(I-B) *p*
Y1	6.50^{bc}	6.62^{ab}	6.63^{bc}	0.12	*0.56*	0.13	*0.43*
Y2	7.29^{a}	6.83^{a}	7.23^{a}	-0.47	*<0.01*	-0.06	*0.18*
Y3	6.87^{ab}	5.73^{d}	6.67^{b}	-1.13	*<0.01*	-0.20	*0.13*
FM1	4.88^{d}	6.30^{b}	4.76^{d}	1.42	*<0.01*	-0.12	*0.52*
FM2	4.82^{d}	5.67^{d}	4.58^{d}	0.85	*<0.01*	-0.23	*0.07*
FM3	7.28^{a}	6.22^{bc}	7.16^{a}	-1.06	*<0.01*	-0.12	*0.20*
FM4	6.05^{c}	5.84^{cd}	6.22^{c}	-0.21	*0.30*	0.17	*0.32*

[*]Identification of samples in Table 1.
[†]Means in the same column with different letters are significantly different ($p \leq 0.05$).

TABLE 5.
PROPORTION OF CONSUMERS SHOWING ASSIMILATION, CONTRAST AND UNCLEAR OR NO EFFECT OF EXPECTATION GENERATED BY INFORMATION*

Sample	Effects	Subjects	%
Y1	Assimilation	59	49.2
	Contrast	1	0.8
	No effect or unclear	60	50
Y2	Assimilation	49	40.8
	Contrast	3	2.5
	No effect or unclear	68	56.7
Y3	Assimilation	58	48.4
	Contrast	10	8.3
	No effect or unclear	52	43.3
FM1	Assimilation	50	41.7
	Contrast	12	10
	No effect or unclear	58	48.3
FM2	Assimilation	45	37.5
	Contrast	18	15
	No effect or unclear	57	47.5
FM3	Assimilation	39	32.5
	Contrast	7	5.9
	No effect or unclear	74	61.6
FM4	Assimilation	55	45.8
	Contrast	9	7.5
	No effect or unclear	56	46.7

*Identification of samples in Table 1.

TABLE 6.
OVERALL ACCEPTABILITY MEAN VALUES OF SAMPLES EVALUATED UNDER BLIND, EXPECTED AND INFORMED CONDITIONS FOR EACH GENDER SUBGROUP OF CONSUMERS. DIFFERENCES (D) BETWEEN THE MEAN RATINGS AND CORRESPONDING PROBABILITIES (*p*) TESTED THROUGH PAIRED t-TEST [*†]

Gender	Sample	Blind (B)	Expected (E)	Informed (I)	(E-B) D	(E-B) *p*	(I-B) D	(I-B) *p*	(I-E) D	(I-E) *p*
MEN (N=48)	Y1	6.25^{bc}	6.88^{ab}	6.48^{bc}	0.63	*0.06*	0.23	*0.40*	-	-
	Y2	7.33^{a}	7.04^{a}	7.29^{a}	-0.29	*0.15*	-0.04	*0.85*	-	-
	Y3	6.79^{ab}	5.88^{cd}	7.06^{ab}	-0.92	*<0.01*	0.27	*0.27*	-	-
	FM1	4.65^{d}	6.38^{bc}	4.63^{d}	1.73	*<0.01*	-0.02	*0.95*	-	-
	FM2	4.92^{d}	5.50^{d}	4.38^{d}	0.58	*0.10*	-0.54	*0.01*	-	-
	FM3	7.27^{a}	6.31^{bc}	7.21^{a}	-0.96	*<0.01*	-0.06	*0.57*	-	-
	FM4	5.75^{c}	5.81^{cd}	5.94^{c}	0.06	*0.85*	0.19	*0.42*	-	-
WOMEN (N=72)	Y1	6.67^{bc}	6.44^{a}	6.72^{ab}	-0.22	*0.36*	0.06	*0.77*	-	-
	Y2	7.26^{a}	6.68^{a}	7.19^{a}	-0.58	*0.01*	-0.07	*0.70*	-	-
	Y3	6.92^{ab}	5.64^{c}	6.40^{b}	-1.28	*<0.01*	-0.51	*<0.01*	0.76	*<0.01*
	FM1	5.04^{d}	6.25^{abc}	4.85^{c}	1.21	*<0.01*	-0.19	*0.43*	-	-
	FM2	4.75^{d}	5.78^{bc}	4.72^{c}	1.03	*<0.01*	-0.03	*0.87*	-	-
	FM3	7.28^{a}	6.15^{abc}	7.13^{a}	-1.13	*<0.01*	-0.15	*0.25*	-	-
	FM4	6.25^{c}	5.86b^{c}	6.40^{b}	-0.39	*0.13*	0.15	*0.51*	-	-

[*]Identification of samples in Table 1.
[†]For each subgroup, men or women, means in the same column with different letters are significantly different ($p \leq 0.05$).

TABLE 7.
OVERALL ACCEPTABILITY MEAN VALUES OF SAMPLES EVALUATED UNDER BLIND, EXPECTED AND INFORMED CONDITIONS FOR THE YOUNGEST AND THE OLDEST SUBGROUPS OF CONSUMERS. DIFFERENCES (D) BETWEEN THE MEAN RATINGS AND CORRESPONDING PROBABILITIES (*p*) TESTED THROUGH PAIRED t-TEST [*†]

Age group (years)	**Sample**	**Blind** (B)	**Expected** (E)	**Informed** (I)	**(E-B)** D	**(E-B)** *p*	**(I-B)** D	**(I-B)** *p*	**(I-E)** D	**(I-E)** *p*
18-30 (*N*=54)	Y1	6.54^{ab}	6.63^{ab}	6.69^{ab}	0.09	*0.68*	0.15	*0.52*	-	-
	Y2	7.11^{a}	6.81^{a}	7.20^{a}	-0.30	*0.18*	0.09	*0.65*	-	-
	Y3	6.70^{a}	5.89^{cd}	6.74^{ab}	-0.81	*<0.01*	0.04	*0.83*	-	-
	FM1	4.93^{c}	6.06^{bcd}	4.96^{c}	1.13	*<0.01*	0.04	*0.89*	-	-
	FM2	5.17^{d}	5.50^{d}	4.93^{c}	0.33	*0.26*	-0.24	*0.20*	-	-
	FM3	7.09^{a}	6.15^{bc}	6.89^{ab}	-0.94	*<0.01*	-0.20	*0.05*	0.74	*<0.01*
	FM4	5.91^{b}	5.93^{cd}	6.31^{b}	0.02	*0.95*	0.41	*0.09*	-	-
>45 (*N*=31)	Y1	6.97^{ab}	6.42^{ab}	6.74^{ab}	-0.55	*0.22*	-0.23	*0.43*	-	-
	Y2	7.48^{a}	6.39^{ab}	6.87^{ab}	-1.10	*0.01*	-0.61	*0.05*	0.48	*0.13*
	Y3	7.03^{ab}	5.68^{ab}	6.77^{ab}	-1.35	*<0.01*	-0.26	*0.25*	-	-
	FM1	4.81^{c}	6.65^{a}	4.81^{c}	1.84	*<0.01*	0.00	*1.00*	-	-
	FM2	4.65^{c}	5.77^{ab}	4.45^{c}	1.13	*0.05*	-0.19	*0.48*	-	-
	FM3	7.58^{a}	6.16^{ab}	7.55^{a}	-1.42	*<0.01*	-0.03	*0.89*	-	-
	FM4	6.52^{b}	5.52^{b}	6.32^{b}	-1.00	*0.01*	-0.19	*0.60*	-	-

[*]Identification of samples in Table 1.
[†]For each age subgroup, means in the same column with different letters are significantly different ($p \leq 0.05$).

TABLE 8.
OVERALL ACCEPTABILITY MEAN VALUES OF SAMPLES EVALUATED UNDER BLIND, EXPECTED AND INFORMED CONDITIONS FOR EACH SUBGROUP OF CONSUMERS WITH SAME PREFERENCE PATTERNS OBTAINED BY PREFERENCE MAP ANALYSIS. DIFFERENCES (D) BETWEEN THE MEAN RATINGS AND CORRESPONDING PROBABILITIES (*p*) TESTED THROUGH PAIRED t-TEST [*†]

Consumers	**Sample**	**Blind** (B)	**Expected** (E)	**Informed** (I)	**(E-B)** D	***p***	**(I-B)** D	***p***	**(I-E)** D	***p***
	Y1	6.00^{b}	6.77^{ab}	6.72^{b}	0.77	*0.01*	0.72	*<0.01*	-0.05	*0.78*
	Y2	7.61^{a}	6.93^{a}	7.28^{ab}	-0.68	*<0.01*	-0.33	*0.07*	-	-
	Y3	7.37^{a}	5.82^{cd}	6.88^{ab}	-1.54	*<0.01*	-0.49	*<0.01*	1.05	*<0.01*
Subgroup I	FM1	5.33^{c}	6.12^{cd}	4.77^{d}	0.79	*<0.01*	-0.56	*0.04*	-1.35	*<0.01*
(N=57)	FM2	4.72^{d}	5.63^{d}	4.58^{d}	0.91	*0.01*	-0.14	*0.48*	-	-
	FM3	7.70^{a}	6.32^{bc}	7.42^{a}	-1.39	*<0.01*	-0.28	*0.03*	1.11	*<0.01*
	FM4	5.11^{cd}	5.67^{d}	5.95^{c}	0.56	*0.03*	0.84	*<0.01*	0.28	*0.21*
	Y1	7.13^{a}	6.52^{ab}	6.60^{b}	-0.60	*0.02*	-0.52	*0.01*	0.08	0.70
	Y2	7.10^{a}	6.85^{a}	7.33^{a}	-0.25	*0.32*	0.23	*0.25*	-	-
	Y3	6.54^{a}	5.52^{d}	6.46^{b}	-1.02	*<0.01*	-0.08	*0.69*	-	-
Subgroup II	FM1	3.42^{c}	6.21^{abc}	4.27^{c}	2.79	*<0.01*	0.85	*<0.01*	-1.94	*<0.01*
(N=48)	FM2	4.13^{b}	5.60^{cd}	3.92^{c}	1.48	*<0.01*	-0.21	*0.26*	-	-
	FM3	7.17^{a}	6.17^{bcd}	7.25^{a}	-1.00	*<0.01*	0.08	*0.60*	-	-
	FM4	6.96^{a}	5.79^{cd}	6.33^{b}	-1.17	*<0.01*	-0.63	*0.02*	0.54	*0.03*

[*]Identification of samples in Table 1.
[†]For each consumer subgroup, means in the same column with different letters are significantly different ($p \leq 0.05$).

FIGURE LEGENDS

FIG. 1.
PURCHASE INTENTION OF CONSUMER (N = 120) FOR DAIRY PRODUCTS WITH DIFFERENT NUTRITIONAL CHARACTERISTICS
Percentage of consumers that declare: Definitely and probably would not buy (▭); Maybe/maybe not buy (▨); Definitely and probably would buy (■).

FIG. 2.
INTERNAL PREFERENCE MAP SHOWING THE POSITION OF THE THREE YOGHURT SAMPLES (Y1, Y2 AND Y3) AND THE FOUR FERMENTED MILK SAMPLES (FM1, FM2, FM3 AND FM4) WITH CONSUMERS (POINTS) CLOSE TO THEIR PREFERRED SAMPLES.

FIG. 3.
MEAN ACCEPTABILITY SCORES FOR CONSUMERS SUBGROUP I (N=57) (▭) AND II (N=48) (■) SEGMENTED BY INTERNAL PREFERENCE MAPPING FOR THE THREE YOGHURT SAMPLES (Y1, Y2 AND Y3) AND THE FOUR FERMENTED MILK SAMPLES (FM1, FM2, FM3 AND FM4).

574
575 **Figure 1**
576
577

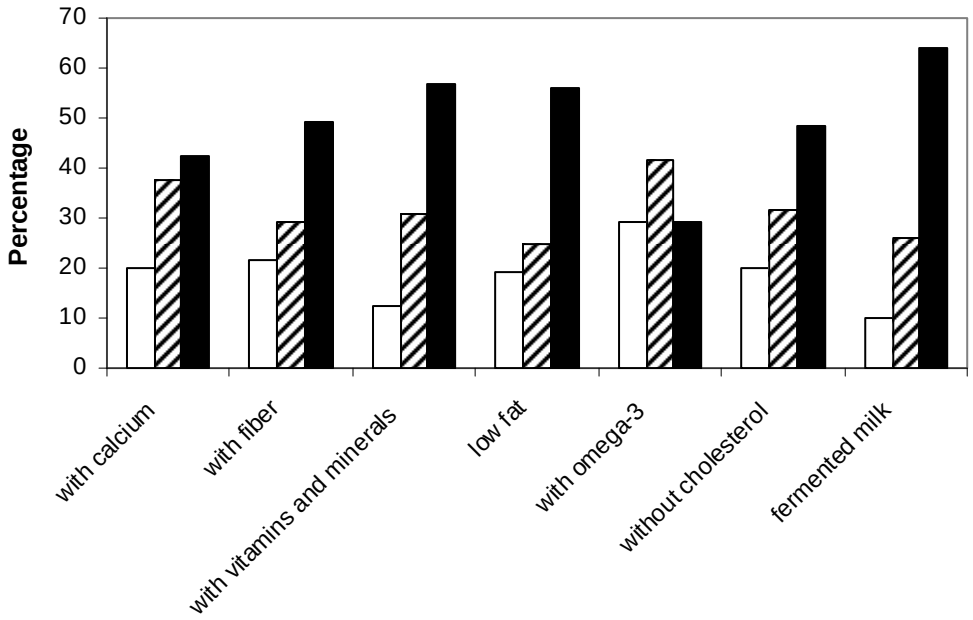

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Figure 2

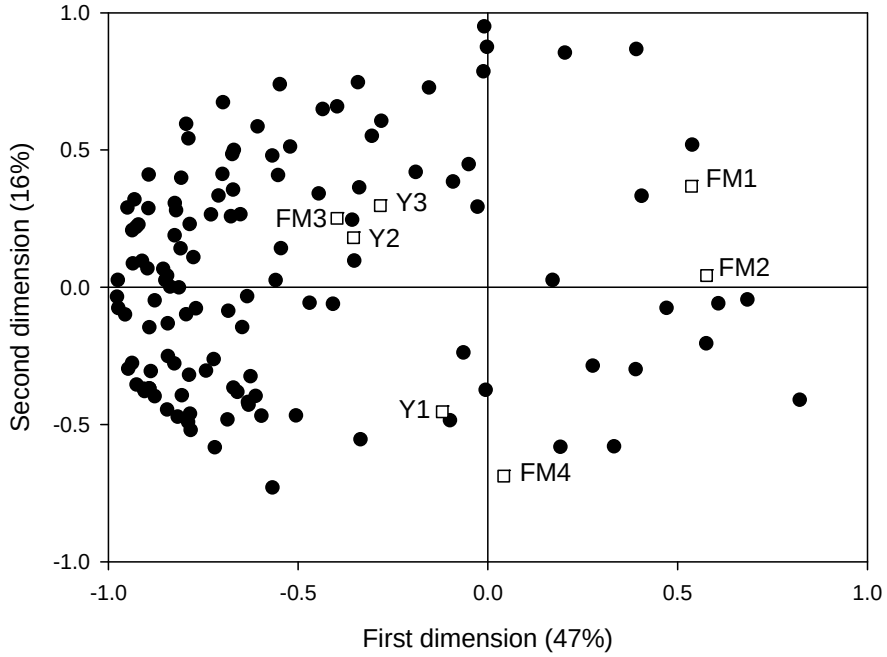
1.0
0.5
0.0
-0.5
-1.0
-1.0
-0.5
0.0
0.5
1.0
Second dimension (16%)
First dimension (47%)
FM1
Y3
FM3
Y2
FM2
Y1
FM4

Figure 3