SENSORY CHARACTERISTICS AND ACCEPTABILITY OF ARGENTINE "PALETA"

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BACKGROUND: Consumer research is one of the key activities of food products companies. This is, ultimately, the most important type of information that companies use to make decisions on development and marketing of new products, the reformulation of existing products, the acceptance of alternative suppliers and processes, the establishment of quality control specifications, etc. The analysis of consumers data is an approach that uses a variety of statistical techniques to relate consumer data to other information in order to gain a full understanding of consumer responses. One of the most consumed meat products has been manufactured in Argentine is a commodity called Argentine "paleta", similar to cooked ham which is made from reestructured pieces of the pork shoulder meat.

OBJECTIVE: The purpose of this study was to assess the sensory characteristics of retailed argentine "paleta" to predict the acceptance of this product by the consumers.

METHODS: Samples were obtained from 5 different commercial brands of argentine "paleta" labelled A, B, C, D=A, E, F and G=B. Argentine "paleta" A was elaborated from one kind of pig breed and the argentine "paleta" B from another. Both of them were manufactured in the same way vacuum packagedand and kept at 2°C until analysis. Samples C, D and E were purchased at the local market and kept under similar condition as A and B. The trained panel consisted of 7 assessors selected by their ability to recognize basic tastes and performance in sequential triangle tests. Assessors developed descriptors individually, followed by round-table discussion to reach consensus (M.C.A.S.A., 1999). Where possible, references were provided to help to uniform the panel response. Samples were coded with 3-digit random numbers. The evaluation procedures used was:

1- observation of the aspects and color of a 2 cm thick-slice of samples placed on plates. The attributes evaluated were: uniformity (ASPHET), holes (ASPHO), wetness (ASPW), gelatinous (ASPGEL), color, distribution and fatness (ASPGC, ASPGD, ASPF), uniformity and dominant colour (ASPCOH, ASPCOD);
2- evaluation of aroma and flavors attributes in judge individual booths on 0.5 cm thick- slice of each sample. The parameters evaluated were: total intensity of typical aroma and flavor of argentine "paleta" (ARP, FLPL), off-aroma (AROFF), porky flavor (FLPR), piquantness (FLP), saltiness (FLS), sweetness (FLSW), off-flavor (FLOFF);
3- evaluation of manual and oral texture in the same booths on 5 cubes of 2 cm. The attributes evaluated were: elasticity and cohesiveness manual (MTXE, MTXC) and oral (OTXE, OTXC), fibrous (OTXFB), firmness (OTXF) and adhesiveness (OTXA).

As indicated by ASTM (1984), samples were served at room temperature. Assessors used bread and tap water at room temperature to clear their palates. Each descriptor was evaluated by marking a 10cm unstructured scale anchored at each extreme. During the profile development sessions, assessors communicated that, due to the strong flavor of these samples, and large number of descriptors to be evaluated, they could not assess more than 4 samples per session. Saturation of chemical senses and carry over effects has been reported by Greenhoff, K. et al. (1994) then a balanced incomplete block (BIB) design was used. A duplicate session was held 1 day after the first with 7 assessors, this meant a total of 8 evaluations per sample. With 4 samples of argentine "paleta", 2 of them twice, an aceptability test was performed.

Consumer panel consisted of 96 persons of differents age, location and sex. They recieved the six samples, one after one, coded with 3 digit random numbers and served to the consumers in slices. They indicated their acceptability on a 9 point hedonic scale from 1= I dislike very much to 9= I like very much. It was chosen a design in which each consumer receives each of several samples so that the number of sample, the positions of sample in order of presentation and preceding sample are balanced over the whole trial: 6 samples, 96 replicates in 16 balanced blocks of 6 consumers. (MacFie, H. 1989). Experimental data were statistically analized using the SSPS 7.5 for Windows and SAS (1987) statistical softwares.

RESULTS AND DISCUSSION: It was determined that five components accounted for 97.49% of the variance in the total set of measurements. Since there was almost as much information in 5 components as in the 25 original variables the remaining components can be ignored without lossing information (Table 1). The component matrix (Table 2) shows the results for the five principal components (PC) computed from the descriptive data. The loadings for the first 5 components represent the correlations between the attributes and each principal component and measure the importance of each attribute to those components. Figures 1 and 2 show a biplot of the first three PC. These components together explained 81% of the system variability. Each point is labelled with the sensory attribute name and the products (coded A to G) are plotted with a symbol to identify them. In Figure 1 the attributes that best described the variability among the samples on the first PC included some aromas, flavors, and all the attributes related to manual and oral texture, then the PC1 would be the component of the "texture". On the second PC the variability between samples included attributes related to the aspect and color consequently PC2 would be the component of the "aspect and color". The attribute FLPR loaded high on PC3 (Figure 2) and was negatively correlated to FLOFF. Samples with high FLPR will have low FLOFF. Only attributes related to flavors loaded high on PC3 then it could be the component of "flavors". ASPF, ASPG and ASPH were aspect attributes that formed a cluster strongly positively correlated to one another over the samples. It would be possible to use only one of them to characterize the aspect of the samples. The group formed by ASPCH and ASPC was strongly positively correlated and opposite to the group formed by ASPF and ASPH, also highly positively correlated. The attribute AROFF was opposite to ARP and the FLPL was opposite to FLPK then the samples that had high AROFF had low ARP and the same situation founded with FLPL and FLPK. The group of attributes related to aspect and color were, in general, independent of the attributes related to flavor and aroma. Results of the present study agree with Nute et al. (1987) for some attributes. The position of the product points indicates how they fall with respect to each other and with respect to the attributes. In samples A and D the aspect and color attributes were very important compared to the attributes related to flavor and aroma, and they played a secondary rol. The sample E characteristics would

allow to define it as reference sample in terms that there was no one or group of attributes that could explain better its variability. Sample G has been influenced by the attributes FLP, AROFF and FLS and in the case of sample C, FLPK and FLOFF played an important rol. Sample B was the same as sample G, however it was possible to notice the variability between them, because the influence of ASPCH and ASPH were less in B than G, but the presence of FLOFF was greater in G than B. Both of them had FLPK but the intensities between the samples were different. Samples A and D were the same and both had similar responses.

The results of regressing acceptability of the samples carried out by consumers, against four factors are summarized in Table 3. The regression model explained 99% of the variability in the consumer acceptability. Factor 2 was the single influential factor ($p<0.0891$). The positive sign of its parameter estimate indicated that the products with higher Factor 2 scores tended to be *more* acceptable. Figure 3 shows acceptability plotted against Factor 2. Since ASPW, FLSW, JUG had high positive loading for Factor 2, we could conclude that products with these attributes were the most acceptable. (samples A, F and D). Therefore, by the same reasoning, attributes such as ASPH, ASPCH, ASPGD, which had high negative Factor 2 loadings, were negatively associated with product acceptance (E).

CONCLUSIONS The attributes related to aspect and color were more important for the consumers acceptability than attributes related to flavor and aroma for cooked shoulder ham.

Argentine "paleta" products with attributes such as wetness, juiciness and swetness were more acceptable than products with heterogeneity of aspect or heterogeneity of color which were negatively associated with product acceptance.

PERTINENT LITERATURE

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FIGURE 1
BIPLOT OF THE FIRST TWO PRINCIPAL COMPONENTS.
DESCRIPTIVE ATTRIBUTES AND THE PRODUCTS

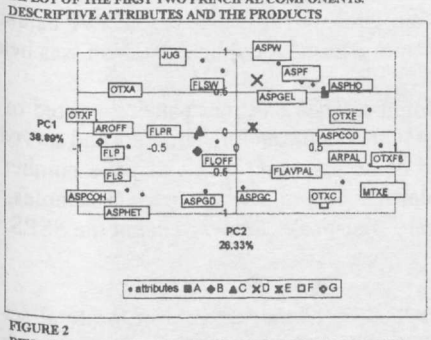

FIGURE 2
BIPLOT OF THE FIRST AND THIRD PRINCIPAL COMPONENTS.
DESCRIPTIVE ATTRIBUTES AND THE PRODUCTS

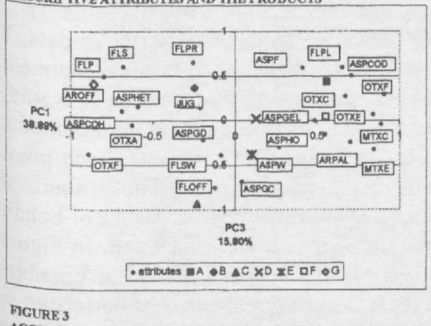

FIGURE 3
ACCEPTABILITY PLOTTED AGAINST PRODUCT SCORES ON THE SECOND FACTOR OF THE PRINCIPAL COMPONENT ANALYSIS

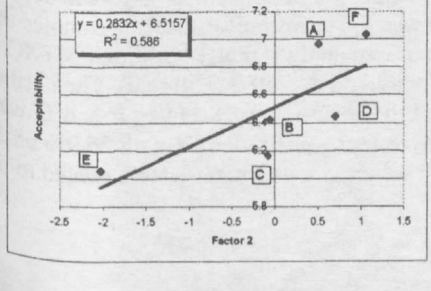

TABLE 1
PRINCIPAL COMPONENTS AND % EXPLAINED VARIANCE

Component	total*	% variance	acumulative%
1	9.72	38.89	38.89
2	6.58	26.34	65.23
3	3.95	15.80	81.03
4	2.26	9.05	90.08
5	1.85	7.41	97.49

*: Principal components with eigenvalues higher than 1.

TABLE 2
PRINCIPAL COMPONENT LOADINGS FOR DESCRIPTIVE ATTRIBUTES

ATTRIBUTES		COMPONENT				
		1	2	3	4	5
ASPECT	ASPHET	-0.592	-0.756	0.164	0.224	0.027
	ASPHO	0.547	0.549	-0.142	0.606	-0.084
	ASPW	0.268	0.863	-0.287	-0.273	-0.141
	ASPGEL	0.482	0.596	0.012	0.616	-0.139
	ASPGC	0.040	-0.675	-0.677	0.181	0.047
	ASPGD	-0.197	-0.722	-0.213	0.569	0.025
	ASPF	0.409	0.628	0.599	-0.070	0.162
	ASPCOH	-0.690	-0.705	0.113	0.115	0.031
	ASPCOD	0.705	0.006	0.512	0.162	0.433
AROMA/ FLAVOR	ARPAL	0.698	-0.251	-0.235	-0.500	0.338
	AROFF	-0.886	0.159	0.243	-0.217	0.285
	FLPL	0.647	-0.291	0.603	0.051	0.361
	FLPR	-0.256	-0.052	0.658	0.183	-0.619
	FLP	-0.799	-0.035	0.507	-0.264	0.176
	FLS	-0.680	-0.169	0.611	-0.221	-0.289
	FLSW	-0.090	0.773	-0.383	-0.110	0.406
	FLOFF	-0.125	-0.112	-0.749	-0.429	-0.427
TEXTURE	MTXE	0.844	-0.399	-0.315	0.059	0.117
	MTXC	0.888	-0.421	-0.037	0.137	-0.054
	OTXE	0.837	0.284	0.079	-0.144	-0.420
	OTXC	0.668	-0.610	0.277	-0.070	-0.312
	OTXFB	0.908	-0.161	0.297	-0.194	0.046
	OTXF	-0.894	0.216	-0.373	0.090	0.074
	OTXA	-0.628	0.496	-0.048	0.492	0.239
	JUG	-0.215	0.904	0.149	0.079	-0.253

TABLE 3

REGRESSION MODEL RESULTS

Variable	Parameter Estimate	Standard Error	T for Ho	Prob>T
INTERCEP	6.468468	0.0848	76.253	0.0083
Factor 1	0.170237	0.0509	3.345	0.1849
Factor 2	0.288228	0.0406	7.098	0.0891
Factor 3	0.174004	0.0743	2.342	0.2569
Factor 4	0.106485	0.1894	0.562	0.6739