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Informational Asymmetry in the Brazilian Orange Juice Market

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Certification, labeling, standardization, traceability, and origin seals take part of a context where the information plays a key role for the guarantee of food safety. However, the available information about food quality attributes is frequently imperfect to consumers, producers, and industry. In the agri-food chain, the consumer is the actor with the lowest degree of information. The main qualitative-quantitative variables of the juice characteristics from different production systems were confronted with an analysis of the consumer perception, in order to clarify the main questions related to the quality of different types of orange juice. The research (185 questionnaires) carried out with consumers of orange juice in the campus "Luiz de Queiroz," University of São Paulo, Piracicaba, São Paulo state, Brazil, showed that the majority of consumers consider that the information on the labels is not clear. Moreover, about 70% of the interviewed participants did not know the difference between orange juice and nectar. The main reason for consumption of orange juice was the flavor and the main reason for buying a specific brand was the price. The results suggest that the orange juice industries practice an opportunistic attitude, taking advantage of the fact that the consumer is unaware of the legal definition of nectar, different types of orange juices, and information on the labels of different orange juices and nectars.

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INTRODUCTION

The quality of food is related to tangible characteristics, which are sensory perceived by the consumer, like color, flavor, odor, and texture, as well as intangible characteristics, not sensory perceived by the consumer, like the production system, sustainability aspects, and chemical composition. Both tangible and intangible characteristics are important for the purchase decision process.

There are several variables interfering in the quality of commercial orange juices, including the cultivars of citrus, agricultural production systems, and technological processing. Some variables are an intrinsic part of orange juices and are only slightly perceptible to the consumer. Orange juice may be marketed as whole juice, without any addition, or may receive added preservatives, sugars, acids, and other substances.

Orange nectar, which receives the addition of several substances, is increasing in supermarket shelves. However, its quality attributes are still not known by most consumers. Recently, the consumption of diverse fruit-based drinks, such as whole and organic juices, nectars, and mixed juices has increased, but very little is known regarding the consumer perception about the information provided by the producers.

In order to identify and discuss the main production and processing aspects that interfere with juice characteristics, a study was performed to evaluate the labels of nectar and orange juices from different production and industrial processing systems. The study included a survey involving qualitative and quantitative variables, with consumers being interviewed on the campus of Luiz de Queiroz, University of São Paulo, Piracicaba, São Paulo state, Brazil.

Certified Citrus

Currently, the Brazilian citrus sector is highly competitive due to several comparative advantages, such as dedicated research institutes, low production costs, proximity and synergy between production farms and industry, as well as large companies with a strong presence in the international market (Turra et al., 2006a). Brazil has a citrus production area of approximately 0.8 million ha (FAOSTAT, 2010), mostly destined to the processing industry, with orange juice being the main product.

The market is facing a change in consumption patterns, particularly with an increasing focus on quality and value-added aspects of the product. The

citrus sector is changing from a producer driven model to a more consumer-oriented market. Therefore, many citrus producers are pursuing different certification options to obtain a commercial advantage. For instance, the insertion of organically cultivated food in the formal market is dependent on the organic certification, which is the formal instrument used to assure the production according to pre-established specifications (Machado, 2005). However, the certification appears in markets with informational asymmetry and some discredit in relation to the quality of the product (Lazzarotto, 2001). In the Brazilian citriculture, there are several types of certification, such as organic, integrated production, and fair trade.

Organic Citrus

The International Federation of Organic Agriculture Movements (IFOAM) is the main organization involved in organic agriculture, and is a worldwide umbrella organization. Organic products are derived from a production system that follows specified standards. The organic production system, such as defined internationally in the Codex Alimentarius and in the Brazilian Law no. 10831 of December 23, 2003, has objectives, such as sustainability, environmental protection, maximization of social benefits, minimization of non-renewable energy use, and optimum utilization of natural resources, as well as respect for the cultural integrity of the agricultural communities and other socioeconomic aspects (Neves et al., 2005).

Brazil is the largest producer of organic frozen concentrated orange juice (OFCOJ) (FAOSTAT, 2010). The main brands of organic orange juice found in the country are Maraú from the Wessanen Company, Native from Usina São Francisco, and Ecocitrus (tangerine juice) from Cooperativa de Produtores de Montenegro (Turra and Guisi, 2004).

Integrated Production of Citrus

The integrated production of citrus is the economical production of high quality fruits, prioritizing ecologically safer methods, minimizing the use and undesirable side effects of agrochemicals, as to enhance the safeguards to the environment and human health (IOBC, 2005). From an economical point of view, its main purpose is increasing the exportation of fruits. In such a way, the main strategy of operationalization and basis of this project is the application of natural resources with an approach for environment preservation and sustainability of the agricultural production, by means of a systematic follow-up of production with frequent monitoring of techniques of integrated pest management, reduction of agricultural pollutant inputs used to assure the diversity and equilibrium of the agro-ecosystem as well as adequate and safe conditions for the worker (Andrigueto and Kososki, 2002).

Regarding the integrated production of citrus, Andrigueto and Kososki (2005) estimate the existence of 95 certified (or on-going certification) farms encompassing an area of around 2,000 ha. In general, the price is not increased by such certification; however, the product has better acceptance in the external market. In the internal market there is no clear or divulged information to consumers in relation to citrus with the integrated production seal.

Fair Trade

According to the global network of Fair Trade Organizations (IFAT, 2009), fair trade is a trading partnership based on dialogue, transparency, and respect that seeks greater equity in international trade. It contributes to sustainable development by offering better trading conditions to, and securing the rights of, marginalized producers and workers. The fair trade mark is an independent seal that appears in final products, being the only guarantee for the consumers from whom the producers had received a price that has covered its costs of production, taking into consideration the economic and environment conditions (Fairtrade Foundation, 2009).

For the product presenting the fair trade seal, it is obligatory that all links of the production chain are in agreement with the international norms for fair trade, which are determined by specialists of the Fair Trade Labelling Organizations International (FLO). A non-profit, multi-stakeholder association involving 23 member organizations (Labelling Initiatives and Producer Networks), traders and external experts, FLO develops and reviews fair trade standards and provides support to fair trade certified producers by assisting them in gaining and maintaining fair trade certification and capitalizing on market opportunities (Fairtrade Association, 2009).

In Brazil there are four fair trade certified citrus producers, which are Cooperativa dos Agropecuaristas Solidários de Itápolis (COAGROSOL), Central de Associações do Litoral Norte (CEALNOR), Associação dos Citricultores do Paraná (ACIPAR), and Cooperativa dos Citricultores Ecológicos do Vale do Caí (ECOCITRUS) and three traders Cocamar Cooperativa Agroindustrial, Citri Agroindustrial S/A, and Margareth Pinati Ribeiro Viu–ME Fruto do Sol (FLO-CERT, 2008). All fair trade orange juice produced in Brazil is destined to the European market. However, these products may be also offered in the Brazilian market.

Orange Juices and Orange Nectar

Brazil is the world's largest producer of orange juice and the main exporter of frozen concentrated orange juice (FCOJ). There are many types of orange juice in the Brazilian retail market, such as FCOJ, not from concentrated (NFC), reconstituted, and nectar.

Most of the commercial orange juices are normally constituted by different cultivars of citrus, processed under distinct technologies, with added preservatives and sugars to regulate the soluble solids level (°Brix) and acidity (Turra et al., 2006b).

FCOJ is pasteurized, conditioned under a vacuum, and cooled to −10°C, which is the storage temperature. The pasteurized orange juice receives thermal treatment and it is cooled to 20°C before being packed. The reconstituted orange juice is obtained by adding potable water to frozen orange juice in order to reduce it from 65°Brix to about 11°Brix, followed by pasteurization and packing (Tribess and Tadini, 2001). The term "whole" (NFC—not from concentrated) is defined as orange juice without the addition of sugar to its natural concentration. The use of this term for reconstituted orange juice is forbidden by Law (Decree no. 2314, September 4, 1997). The juice is extracted from the fruits and is consumed without passing through the stages of concentration and further reconstitution. The great advantage of this type of juice in comparison with the reconstituted one is the flavor, which is similar to fresh juice. The production of the NFC is differentiated due to the criterion of the choice of the selected fruits and process of juice extraction (Barbosa and Curtolo, 2005).

According to the Brazilian legislation, nectar is a non-fermented beverage obtained through the dilution in drinking water of the edible part of the fruit and sugars or of fruit extract and sugars, allowing the addition of acids and destined for direct consumption (Decree no. 2314, September 4, 1997). Juice is the non-diluted beverage obtained from fresh, healthy, and ripe fruits.

Informational Asymmetry

The informational asymmetry is a common phenomenon in the food sector, since the industry has a great amount of information about a specific product that is not transmitted to consumers. When there is informational asymmetry, there is space for the exercise of opportunistic behavior, resulting in a transaction cost increase (Williamson, 1985). Productive sector agents may reveal information in a selective way, utilizing the informational asymmetry for their own benefit.

Market imperfections regarding interests between public and private assets, may cause differences between what is desired by the public and private sectors in terms of quality and safety. This leads to opportunistic actions by organizations that may use or retain the knowledge and information about some aspects of the product (Spers et al., 2003).

When a customer is willing to pay more for a distinguished product, the seller must show clear signs regarding the product attributes to convince him (Peri and Gaeta, 1999) by making use of this information as a competitive advantage.

A manner of reducing the informational asymmetry of any agribusiness product is the appropriate labeling (Nassar, 2003) that is every title, subtitle, image or every descriptive, graphical, written, or printed matter in relief, lithographed or stuck upon the food label (ANVISA, 2002).

MATERIALS AND METHODS

For the development of this study, a literature review was carried out, as well as a critical analysis of the labels of juices and nectars of oranges and a qualitative and quantitative survey of commercial orange juice consumers involving professors, employees, students from October 2005 to May 2006 on the Luiz de Queiroz campus, University of São Paulo, Piracicaba, São Paulo state, Brazil. The survey was conducted using a simple random sampling approach.

The quantitative survey was used to select opinions and explicit attitudes of interviewees applying structured instruments (questionnaires) (IBOPE, 2006). The qualitative survey allowed us to obtain more specific individual data. The great advantage of this type of survey for the study of the organizations is the quality of the obtained details (Bryman, 1989; Ghauri and Gronhaug, 1995).

The instrument used for the survey was one questionnaire, designed from the theoretical referential discussed along this work, with three questions (age, gender, and education) to identify the consumer profile and eight questions about the interviewee perception in relation to orange juice.

According to the data supplied from assessorship communication of ESALQ and data available on the website http://www.esalq.usp.br/instituicao/esalq_hoje.html (second semester of 2006), in 2006 there were 1,837 graduation students, 975 post-graduation students, and 756 employees (228 professors) at Escola Superior de Agricultura Luiz de Queiroz (ESALQ). At Centro de Energia Nuclear na Agricultura (CENA) the data supplied by the post-graduation office and assessorial of the principalship, there were 103 post-graduation students and 175 employees (39 professors). Thus, ESALQ and CENA totaled 3,846 people on Luiz de Queiroz campus, being 1,837 graduation students (47.7%) and 1,078 post-graduation students (28%). The profile of the interviewed people is shown in Table 1. The

TABLE 1 Profile of the Interviewed Participants

Age, years old		Education		Gender	
16–25	58%	1st grade	5%	Female	58%
26–35	25%	2nd grade	22%	Male	42%
36–45	12%	Graduation	48%		
46–55	5%	Post-graduation	25%		

research comprised 4.8% (185 interviewed of the total 3,846) of the campus population.

RESULTS AND DISCUSSION

The labels of all packaging of orange nectars showed the same composition: frozen concentrated orange juice, water, and sugar. The same occurred for reconstituted orange juices. The prices of orange nectars were on average (R$4.64 ± 0.80) higher than orange juices (R$4.00 ± 0.70) in the retail market.

Turra et al. (2006b) analyzing whole and reconstituted orange juice found significant elemental concentration differences for Br, Rb, K, Cs, La, and Zn where the best discriminator was K (whole: 15,040 ± 670 mg/kg^{-1}; reconstituted: 10,700 ± 2,900 mg/kg^{-1}). These results suggest that the consumers may be purchasing a product (nectar) of inferior quality for a higher price.

In the present survey (Fig. 1), the consumption of industrialized orange juice was 37% weekly, 33% occasionally, 22% bi-weekly, and 8% monthly.

A survey carried out at the University of São Paulo, Brazil, aiming to investigate the orange juice consumption in a group of 180 university students, in August 2004 (Neves et al., 2005), showed that 27–28% of the students consumed orange juice once a week, and only 3–4% were daily consumers.

The main reason for orange juice consumption was the flavor and the main reason to purchase a specific brand was the price (Figs. 2 and 3).

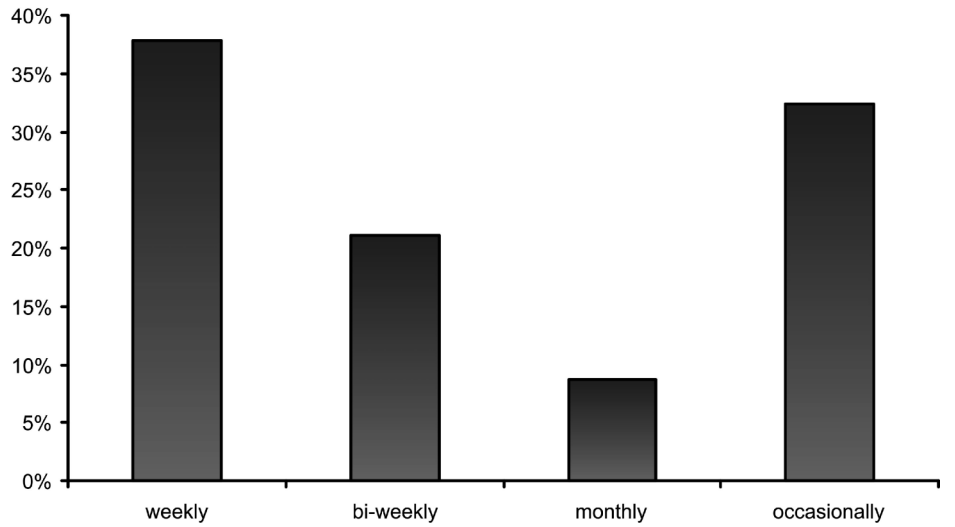

FIGURE 1 Frequency of orange juice consumption.

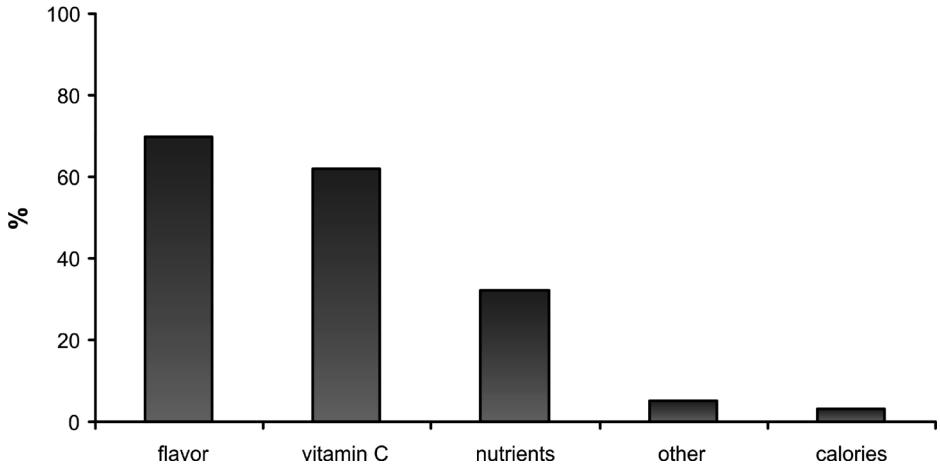

FIGURE 2 Main reasons for the consumption of orange juice.

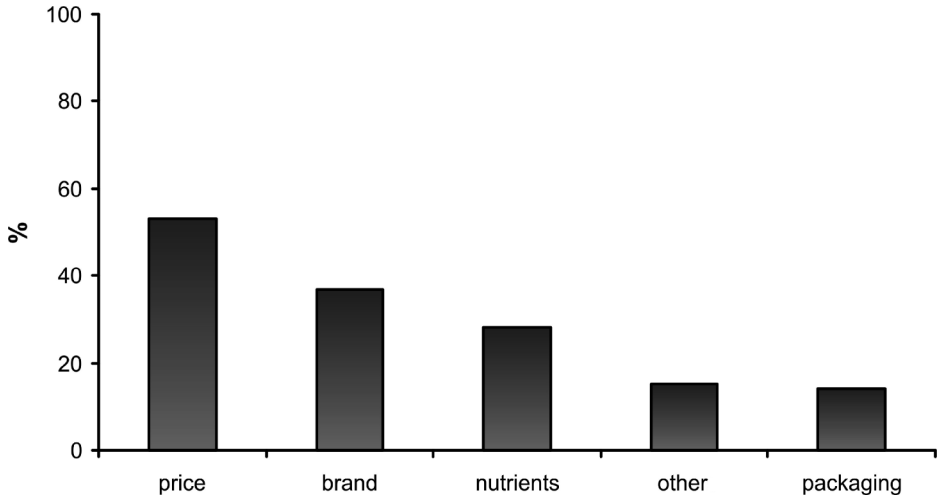

FIGURE 3 Main factors for purchasing a specific brand of orange juice.

These results corroborated research carried out in 11 countries (Australia, Brazil, Canada, China, USA, France, Germany, Japan, Mexico, Italy, United Kingdom) where the intrinsic aspects of the product (freshness, nutrition, flavor, and safety) were more relevant than price and convenience among the most important factors in the food choice (Neves and Castro, 2003). Lotong et al. (2003) observed that the orange juice products could be categorized based on flavor. The results of this research showed similar flavor characteristics of orange juice products manufactured with similar processing methods.

Urdan and Urdan (2001) and Sawyer et al. (1979) observed that the consumer, during the process of purchase decision, combines intrinsic attributes (flavor, aroma, quality, and income), extrinsic attributes (packaging, design,

label, seal), and perceived price, in determining the product quality. They concluded that the lay consumer has difficulty in choosing and distinguishing competitive offers by intrinsic factors.

According to the Brazilian Normative Instruction no. 12, September 4, 2003 the nectar without a minimum amount of pulp determined in the specific Technical Regulation, must contain a minimum of 30% of pulp. However, for fruit with acidity or a great amount of pulp or strong flavor, the amount of pulp cannot be inferior to 20% (m/m).

The tropical juice without a minimum amount of pulp established in specific Technical Regulation must contain a minimum of 50% of pulp, however, for fruit with acidity or a great amount of pulp or strong flavor, the amount of pulp cannot be less than 35% (Normative Instruction no. 12). The orange is not considered a fruit with acidity or a great amount of pulp or strong flavor.

According to the minimum amount of pulp for juice and nectar specified by Brazilian legislation (30% for nectar and 50% for juice) the nectar may be of inferior quality compared to reconstituted orange juice.

In the Brazilian legislation it is not intended to inform the consumer as to the content of juice or pulp on the label of nectar and orange juice. The Council Directive 2001/112/EC of the European Union (2002) establishes that the label must indicate the minimum content of fruit juice, purée, or any mixture of these ingredients, through the statement of fruit content and minimum percentage.

Figure 4 shows that the consumer does not know the difference between nectar and juice and the difference among types of orange juice. Approximately 90% of the interviewees considered it important to know these differences.

When food contains nutrients in less or equal amounts to that established by Brazilian legislation as non significative, the label can be expressed as "zero" (0) or "does not contain" in accordance to Table 2.

The industry may emphasize segmentation inside the orange juice market through types of certification as well as indicating the differences and advantages to the consumer on the label. The content of nutrients, such as potassium, can help to differentiate a product (commercial orange juice contains on average 300 mg of K per portion). The industry can improve the image of its products by increasing the quality of the information provided.

The choice of one certain product in a wide variety of products depends on the identification of the attributes of the product. The factors that determine and influence the process of choice of the consumer are directly linked to the perception that she/he has, in accordance with the needs and desires that must be met (Costa et al., 2007). However, the present information on the labels of orange juice and nectar is not clear; thus, the power of choice of the consumer is affected by not being aware many times of what is being purchased.

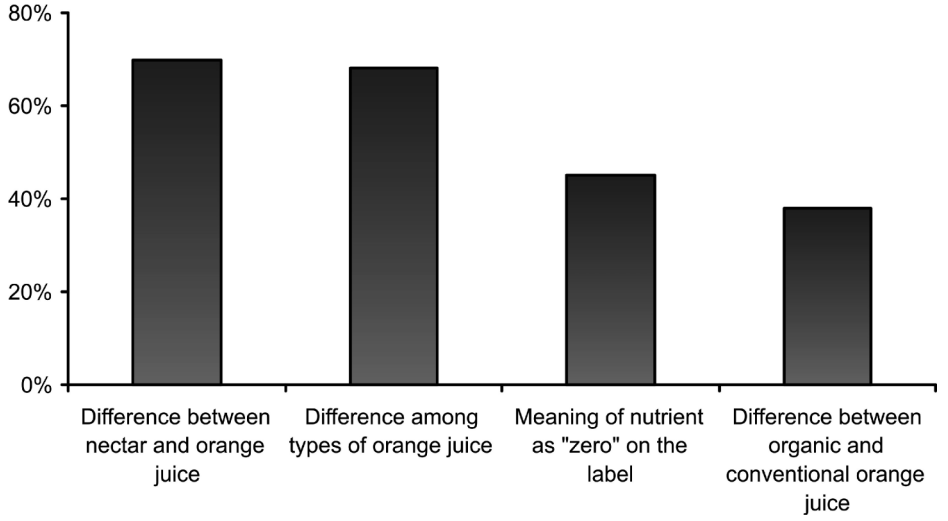

FIGURE 4 Consumer perception of juices.

TABLE 2 Values Declared as "Zero" or "Do Not Contain" When the Nutrients Are in Non Significant Amounts (ANVISA, 2005)

Energetic value/nutrient	Non significant amount per portion (g or mL)
Energetic valor	Less or equal to 4 kcal/less 17 kj
Carbohydrate	Less or equal to 0.5 g
Proteins	Less or equal to 0.5 g
Total fats	Less or equal to 0.5 g
Saturated fats	Less or equal to 0.2 g
Trans fats	Less or equal to 0.2 g
Alimentary fiber	Less or equal to 0.5 g
Sodium	Less or equal to 5 mg

CONCLUSIONS

The information presented on the label of orange juice is not clear to the consumer. It is necessary to show the differences among nectars, juices, and other drink choices and the differences among other kinds of orange juices (whole, reconstituted, frozen concentrated) as well as nutritional information.

The survey showed the main reason for choosing orange juice is the flavor and the major factor that leads the consumer to buy a specific orange juice is the price.

Considering that the whole orange juices have a higher quality than the reconstituted juices, as their taste is closer to that of fresh juice and they do not receive additives in the production process, their price should be higher

than other juices for their higher aggregated value. The opportunistic behavior of the orange juice industry reflects mainly on the price and information on the label.

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LITERATURE CITED

ANVISA–Resolução. 2002. RDC n° 259, de 20 de setembro de 2002. Retrieved July 15, 2009, from http://www.anvisa.gov.br/legis/resol/2002/259_02rdc.htm

ANVISA–Agência Nacional de Vigilância Sanitária. 2005. Rotulagem Nutricional Obrigatória—Manual de Orientação à Indústria de Alimentos. Universidade de Brasília. Brasília, DF, 44 p.

Andrigueto, J.R., and A.R. Kososki. 2005. Desenvolvimento e conquistas da produção integrada no Brasil–até 2004. Retrieved from http://www.inmetro.gov.br/qualidade/relatorio2005.doc

Andrigueto, J.R. and A.R. Kososki. 2002. Marco Legal da Produção Integrada de Frutas do Brasil. MAPA-SARC, Brasília, DF, 60 p.

Barbosa, R.D., and J.E. Curtolo. 2005. Produção industrial de suco e subprodutos cítricos. In: Junior, D.M., J.D. Negri, R.M. Pio, and J.P. Junior (eds.). Citros. Instituto Agronômico/FUNDAG, Campinas.

Bryman, A. 1989. Research methods and organization studies. Routledge, New York.

Costa, M.F., J.C.N. Vilarindo, and T.G.M. Costa. 2007. Determinantes da Decisão de Compra do Consumidor no Setor Supermercadista. X Semead.

Decree n° 2314. de 04 de setembro de 1997. Retrieved November 18, 2009, from http://www.receita.fazenda.gov.br/legislacao/Decretos/Ant2001/Ant1999/Dec231497.htm

EU Council Directive 2001/112/EC. 2002. Retrieved December 15, 2008, from http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg= en&type_doc=Directive&an_doc=2001&nu_doc=112

Fairtrade Foundation 2009. Retrieved December 12, 2009, from http://www.fairtrade.org.uk/what_is_fairtrade/default.aspx

Fairtrade Association 2009. Retrieved December 12, 2009, from http://www.fta.org.au/flo

FAOSTAT. 2010. Oranges by country, 2008. Retrieved April 22, 2010, from http://faostat.fao.org/site

FLO-CERT. 2008. Fair Trade Operators. Retrieved November 8, 2008, from http://www. flo-cert.net/flo-cert/main.php?id=10

Ghauri, P.N., and K. Gronhaug. 1995. Research methods in business studies: A practical guide. Prentice Hall, New York.

IBOPE. 2006. Pesquisas IBOPE. Retrieved November 8, 2008, from http://www.ibope.com.br/calandraWeb/BDarquivos/sobre_pesquisas/tipos_pesquisa.html

IFAT. 2009. What is fair trade? Retrieved April 18, 2009, from http://www.ifat.org/index.php?option=com_content&task=view&id=1&Itemid=13

IOBC Technical Guideline III. 2005. Guidelines for Integrated Production of Citrus Fruits. Retrieved April 10, 2009, from http://www.iobc.ch/IOBC_Citrusguideline_english_definitive.pdf

Lazzarotto, N.F. 2001. Estudos sobre o mercado de certificações de qualidade em alimentos no Brasil. V-SEMEAD, Ensaio P.N.E.E. São Paulo, 11 p. Retrieved December 18, 2009, from http://www.ead.fea.usp.br/Semead/5semead/PNEE

Lotong, V., E. Chambers, and D.H. Chambers. 2003. Categorization of commercial orange juice based on flavor characteristics. J. Food Sci. 68(2):722–725.

Machado, R.T.M. 2005. Sinais de qualidade e rastreabilidade de alimentos. In: International conference on agri-food chain/networks economics and management, Ribeirão Preto. Anais do IV Congresso Internacional de Economia e Gestão de Negócios (networks) Agroalimentares. PENSA/USP–FUNDACE, Ribeirão Preto.

Nassar, A.M. 2003. Certificação no Agribusiness. In: Zyberztajn, D., R.F. Scare (eds.). Gestão da Qualidade no Agribusiness. São Paulo-SP, p. 30–39.

Neves, M.F., and L.T. Castro. 2003. Comportamento do consumidor e novo consumidor de alimentos. Marketing e estratégia em agronegócios e alimentos. Editora Atlas, São Paulo SP.

Neves, M.F., F.F. Lopes, and L. Teixeira. 2005. Juice consumer behaviour in Brazil. Fruit Proc. 15(2):86–90.

Peri, C., and D. Gaeta. 1999. Designations of origin and industry certification as means of valorising agricultural food products. In: Vinci, S. (Coord.). The European agro-food system and the challenge of global competition. ISMEA, Roma, p. 59–68.

Spers, E.E., D. Zybersztajn, and S.G. Lazzarini. 2003. Percepção do consumidor sobre os mecanismos de qualidade e segurança em alimentos. Revista Eletrônica do Mestrado de Administração da UNIMEP, set/dez. 1(1):11–44.

Sawyer, A.G., P.M. Worthing, and P.E. Sendak. 1979. The role of laboratory experiments to test marketing strategies. J. Marketing, 43(3):60–67.

Tribess, T.B., and C.C. Tadini. 2001. Suco de laranja natural minimamente processado: Uma alternativa para ampliar o mercado de suco de laranja no Brasil. Retrieved January 24, 2009, from http://www.fearp.usp.br/egna/resumos/CarmenTadini.pdf

Turra, C., and F. Guisi. 2004. Laranja orgânica no Brasil: Produção, mercado e tendências. Anais XLII Congresso da SOBER–Cuiabá–MT–25 a 28 de Julho de 2004.

Turra, C., E.A.N. Fernandes, M.A. Bacchi, F.S. Tagliaferro, and E.J. França. 2006a. Differences between elemental composition of orange juices and leaves from organic and conventional production systems. J. Radioanal. Nucl. Chem. 270:203–208.

Turra, C., E.A.N. Fernandes, F.S. Tagliaferro, M.A. Bacchi, A.A. Fogaça, and C.L. Gonzaga. 2006b. INAA na avaliação de autenticidade de sucos de laranja. In: XII Encontro Científico dos pós-graduandos no CENA, Piracicaba, SP, Brazil. Cenário e perspectivas científicas.

Urdan, F.T., and A.T. Urdan. 2001. O impacto da marca sobre as preferências do consumidor: Um experimento com cervejas. In: Encontro Nacional da Associação Nacional de Pós-Graduação em Administração, 25, Rio de Janeiro. Anais eletrônicos. Rio de Janeiro: ANPAD.

Williamson, O.E. 1985. The economic institutions of capitalism. The Free Press, New York.