



Quality perceptions regarding external appearance of apples: Insights from experts and consumers in four countries

Sara R. Jaeger^{a,*}, Lucía Antúnez^b, Gastón Ares^b, Marianne Swaney-Stueve^c, David Jin^a,
F. Roger Harker^a

^a The New Zealand Institute for Plant and Food Research Limited, 120 Mt Albert Road, Private Bag 92169, Victoria Street West, Auckland, New Zealand

^b Sensometrics & Consumer Science, Instituto Polo Tecnológico de Pando, Facultad de Química, Universidad de la República, By Pass de Rutas 8 y 101 s/n, CP 91000, Pando, Uruguay

^c Sensory & Consumer Research Center, Kansas State University, 22201 W Innovation Drive, Olathe KS 66061, KS, USA

ARTICLE INFO

Keywords:

Fruit quality
Defects
Bruising
Sorting
Consumer research
Postharvest
Appearance

ABSTRACT

Apples, one of the most popular fruit worldwide, are globally traded and consumers benefit from hyper-competition in the industry. To remain profitable, producers must offer very high quality fruit at competitive prices. This research sought to better understand consumers' quality perceptions. We focused on external appearance, a readily available quality cue. Insights were gained from a categorization task where participants sorted images of apples based on perceived quality. A comparison between experts' (n = 37) and consumers' (n = 297) quality perceptions based on external appearance revealed high similarity. Both groups considered fruit with minor defects as inferior to fruit with no external defects. The consumers, who represented four different countries (72–76 per country; loosely regarded as a proxy for the global population of apple consumers), perceived the quality of the apples very similarly. Three quality groupings were established, representing apples with high quality, minor defects and major defects, respectively. The last-mentioned grouping consisted of any apple that showed signs of rot or mold, or where there the skin had been cut. Blemishes and odd shapes were generally regarded as minor defects. Both types of defects were associated with negative hedonic expectations, which increased with the severity of the external defect. The implications for consumers' purchase-related cognitions were clear and associated with rejecting consumption. This has associated implications for efforts to reduce food waste.

1. Introduction

Apples are one of the most widely cultivated and consumed fruits worldwide (Tsao, 2016). The apple industry faces market saturation in terms of market supply, which has led to hyper-competition, i.e. intense competition based on price-quality positioning (Axelson and Axelson, 2000; Harker et al., 2003). In this context, producers need to deliver high quality fruit at the highest possible price point to remain profitable (Doerflinger et al., 2015).

Fruit quality can be regarded as a complex construct pertaining to its ability to fulfil consumers' needs and expectations (Barman et al., 2015) or to meet the standards for a specific use (Musacchi and Serra, 2018). From the consumers' point of view, external fruit appearance is mainly determined by shape, size, color and the lack of defects, whereas internal quality is mainly shaped by flavor, texture and absence of defects (Musacchi and Serra, 2018).

External quality is the main determinant of consumers' choices at the point of purchase, whereas their decisions to repeat purchase are more strongly influenced by internal quality (Barman et al., 2015). For this reason, external quality plays a central role in the definition of quality standards, which are mainly based on morphometric attributes, product integrity, and lack of external appearance defects (Kyriacou and Rouphael, 2018). In particular, the long marketing chain of fruits makes physical damage during harvesting, grading, packing and distribution through the supply chain a major cause of downgrading and postharvest loss (Opara and Pathare, 2014).

A gap between commercial quality standards and consumers' expectations may exist (Kader, 2008), as the criteria underlying these standards are usually determined based on the perception of technical experts (OECD, 2010; Zhou et al., 2004). An in-depth understanding is still lacking of how the degree of different defects influences consumers' quality perceptions and deters purchase (Kyriacou and Rouphael,

* Corresponding author.

E-mail address: sara.jaeger@plantandfood.co.nz (S.R. Jaeger).

2018).

High visual quality standards influence and encourage consumers to expect impeccable fruit products (Kyriacou and Rouphael, 2018). In this sense, previous research has shown that small changes in external appearance of apples have been reported to reduce consumers' acceptance (de Hooge et al., 2017; Jaeger et al., 2018), which contributes to food waste worldwide (Gustavsson et al., 2011). The increasing concern over the burden of food waste on the sustainability of the food sector and food security stresses the need to develop standards based on consumer perception, to help determine which fruits should be classified as lower quality and sold at lower prices or discarded (de Hooge et al., 2017; Eriksson et al., 2012; Hanssen et al., 2016; Kulikovskaja and Aschemann-Witzel, 2017).

1.1. Research objectives and strategy

In the case of apples, the current study contributes to a closing of the knowledge gap regarding the influence of external defects on consumers' quality perceptions. Industry regulators, marketing commissions and brands often set stringent criteria for acceptable external fruit appearance that must be met for the fruit to be sold as high value premium products. In many cases, these criteria become embedded industry benchmarks. The consequences of these criteria are not only in the proportion of fruit wasted, but also in the need for investment in technology (e.g. high-speed computerized image sorting) to exclude defects during packing, and the economic viability of growers, whose profitability is affected by the proportion of the crop that is defect free. The objectives of the work were to: 1) compare experts' and consumers' quality perceptions of apples based on external visual quality, 2) evaluate cross-cultural similarities/differences in consumers' perception of external visual quality, and 3) explore consumers' purchase-related perceptions towards apples with different degrees of external appearance quality.

The research objectives were addressed through an experimental task that required participants to categorize apples based on perceived quality as judged by external appearance. Sorting - a well-established methodology in psychology, anthropology, sensory and consumer research - was used (Varela and Ares, 2012). Sorting is based on categorization, a natural cognitive process that people regularly use in their daily lives (Chollet et al., 2014). It enables study of how people classify objects and the characteristics they attend to for such classification (Black, 1963). This method was particularly suited to explore how experts and consumers in different countries classified apple images according to the quality of their external appearance. Sorting is not based on the evaluation of specific terms and does not require verified translation of a questionnaire into more than one language, which makes it particularly suited for cross-cultural studies (Ares, 2018). Moreover, the addition of a description phase to the task enables the exploration of the most salient associations with the samples. In the present study, consumers' descriptions of apples with different quality perceptions were used to explore their sensory expectations and purchase-related perceptions.

2. Materials and methods

2.1. Participants

The experts (n = 37, male = 57%) were living in New Zealand and qualified for participation based on experience. They were recruited through a snowball approach initiated by author FRH and 92% were staff at The New Zealand Institute for Plant and Food Research Limited. Approximately one third of the experts specialized in apple-related scientific research, while the others conducted or oversaw research in other fruit sectors. More than half had 20+ years of research experience. A minority of participants (8%) were senior managers in positions linked to the fruit industry.

Consumers from four countries, a proxy for the global apple-consuming population, participated in the study: China, New Zealand (NZ), the United States (USA), and Uruguay. The four consumer samples were similarly sized and had identical distributions for age group (50% were 25–40 years old and 50% were 41–69 years old) and gender (75% female and 25% male). In the USA (n = 75) and Uruguay (n = 72) participants were recruited from a database of research groups according to their consumption frequency of apples, as well as their interest in and availability to participate in the study. In New Zealand (n = 74), consumers were recruited by a professional recruitment company based on declared liking for apples and regular consumption. The Chinese consumers (n = 76) were living in New Zealand at the time of the study, but were considered to be fairly recent immigrants (< 4 years) who had retained strong Chinese cultural ties. Similarly to conditions for the other consumer groups, declared liking for apples and regular consumption was required for participation.

All participants, experts and consumers alike, gave informed consent to participation in the study, and received compensation in the form of a small gift or a cash incentive.

2.2. Apple images

Images of apples were used as the research stimuli, since this was the only way to ensure that all participants (experts and consumers in four countries) would respond to the same stimuli. Directed by the overall aim of the research i.e., to explore quality perceptions linked to external appearance, the inclusion of apples with no external defects, different types of defects, and defects of varying severity was purposeful. Similarly, apples from three cultivars were included: 'Royal Gala' (n = 20), 'Braeburn' (n = 2) and 'Sciros'/Pacific Rose™ (n = 3). These are very popular globally, and the inclusion of multiple cultivars mitigated against lack of consumer familiarity and contributed to greater generalizability of the results.

A total of 25 images of real apples were included (Fig. 1), of which seven were images of apples with no external defects (ND1-ND7). The remaining 18 had different degrees of six external defects: blemish (BL1-BL5), bruising (BR1), crushed flesh (CR1-CR2), odd shape (OS1-OS5), cut flesh (CU1-CU2), rot/mold (RM1-RM3). These five types of defects were selected because they represent the range of characteristics that arise as anomalous development of fruit (e.g., odd shapes), natural damage to the skin that occurs during growth on the tree (e.g., russet and sunburn), damage that can occur during harvesting and packing (e.g., splits and bruises) and rots that might not be apparent at harvest, but develop during storage. Ecological relevance was ensured by intercepting these apples in retail stores. Since the research was explorative and direct comparison of different types of external quality defects was not an objective, non-systematic variation in the defects, their severity and number of included images per defect was acceptable.

Candidate apples for inclusion in the study - with and without external damages - were purchased from local fruit shops in Auckland (New Zealand). In three instances, external damages were purposely created 3 h before photographs were taken: CU1 (cut flesh), CR1 and CR2 (crushed flesh). The 25 final images were selected among 85 candidate images by the authors who had with significant experience with fruit quality.

High quality color images of candidate apples were taken by a professional photographer in a studio, and they were printed on white paper (200 g/m²). The images were always printed in real size and framed in a box measuring 10 × 10 cm. They were identified by 3-digit random codes.

2.3. Experimental task

The 25 images were presented to each participant simultaneously, piled in random order. Participants were asked to perform a sorting task which grouped the apple images according to their perceived quality.

Download English Version:

<https://daneshyari.com/en/article/10117103>

Download Persian Version:

<https://daneshyari.com/article/10117103>

[Daneshyari.com](https://daneshyari.com)