This study (1) evaluated the perceptions of Argentinian and Brazilian consumers regarding yogurt fortified with dairy proteins, legume proteins, or a combination of both, and (2) determined the satiety expectations of these foods as well as the consumers’ intentions to taste and purchase protein-fortified yogurt. A total of 298 Argentinian and 100 Brazilian participants completed an online survey for this study. The free word association technique was used to investigate their perceptions about “satiety” as a verbal stimulus and 6 concepts of yogurt as visual/verbal stimuli (yogurt, set yogurt, skim set yogurt, skim set yogurt with a high content of dairy proteins, skim set yogurt with a high content of legume proteins, and skim set yogurt with a mix of dairy and legume proteins). The expected satiation and intentions to taste or purchase were evaluated using categorical scales. Regardless of their cultural background, participants from both countries expressed similar associations with the stimuli presented. Yogurt and set yogurt were associated with consumption occasions, sensory characteristics, liking, and foods, whereas skim yogurt was associated with diet food. Products fortified with proteins were associated with healthy foods, regardless of the protein source, and they yielded the highest rates for expected satiation. Brazilian participants were more likely to taste the food with a combination of proteins; however, participants from both countries were indifferent to purchasing the product. Important characteristics in the design and marketing of these products were pleasant sensations, such as “fullness,” “satisfied,” and snacks to eat “on the go,” and the vegetarian consumers’ segment. The combination with fruits or cereals, creaminess, and vanilla flavor should also be considered. The study findings could have implications for the dairy industry when designing yogurt fortified with proteins and communicating the nutritional and wholesome properties of these products.

Key words: dairy proteins, plant proteins, satiety, food culture, free word association

INTRODUCTION

Overweight is the largest worldwide public health problem, with a global prevalence of 39% among people over 18 years old (World Health Organization, 2021). Proteins are the nutrients that promote the greatest satiating effects in humans, which explains the focus on the development of fortified products (Morell and Fiszman, 2017). To meet consumers’ demands for improved satiating products, the food industry has designed a variety of protein-fortified foods (Grand View Research, 2019).

Fermented milk and yogurt are traditionally used as vehicles for fortification, and dairy proteins such as skim milk powder, whey concentrates, and caseinates have been used as fortifiers (Morell et al., 2015a; Grand View Research, 2019). However, legumes (i.e., chickpea, lentils, pea, and lupin) have emerged as lower-cost sources of proteins (Maphosa and Jideani, 2017). In addition, consumers believe that plant proteins are more sustainable than dairy proteins from the ecological point of view (Banovic et al., 2018).

Legumes have satiating effects on humans when consumed as a regular part of the diet (Maphosa and Jideani, 2017). Satiety has been attributed to the fiber and protein contents as well as the presence of bioactive
peptides. In Argentina, the consumption of legumes is lower (800 g/yr per capita) than in Brazil (17 kg/yr per capita) (Calzada and Treboux, 2019). Therefore, using legume proteins to enrich foods may result in increased consumption in countries where their intake is low. Yogurt is highly consumed by people from both countries, and the fortification of yogurt with both legume and dairy proteins could represent an alternative to increase protein and nutrient intake at an affordable price in low-income countries.

Perceptions are beliefs about food that are decisive factors for the consumption and purchase of food products (Ares et al., 2008). They are determined by the familiarity with the products and vary according to the country, the gender and age of consumers, and the context of consumption (i.e., occasion, cultural environment). Knowledge about and attitudes toward food arise from the food cultural background established during childhood, as well as the constant flow of information about food in daily life (Johansen et al., 2011). The free word association (FWA) technique is a qualitative approach used for investigating perceptions. It consists of presenting a visual or verbal food stimulus onto which the consumer projects ideas, feelings, motivations, and thoughts; such projections are decisive in determining the consumption of a food product (Ares et al., 2008). Consumer perceptions are important to the food industry and authorities for the design of new products and communication about them (Johansen et al., 2011).

Expectations of satiation are beliefs about the extent to which a food is expected to deliver fullness (Fiszman and Tarrega, 2017). Satiation is determined by several intrinsic characteristics of foods such as the composition (energy density, content of nutrients) and sensory properties (taste, texture), as well as extrinsic factors related to consumer perceptions (Fiszman and Tarrega, 2017). Furthermore, in the case of protein-enriched product, the question arises as to whether satiety expectations are influenced by the type of added protein (Banovic et al., 2018). Controversial evidence exists regarding the expected satiety of different protein sources (i.e., animal or plant) (Johnstone, 2013). Studies conducted in the European population suggest that although plant proteins are seen as more sustainable, they are not the ones chosen by consumers to deliver fullness (Brunstrom et al., 2008; Fiszman et al., 2014; Banovic et al., 2018). Rather, the combination of a protein source and a conventional food carrier was found to be more acceptable (Banovic et al., 2018). Given that developing foods fortified with legume proteins is possible, we conducted a cross-cultural qualitative study among Argentinian and Brazilian consumers to (1) evaluate perceptions about satiety and 6 concepts of yogurt (with and without protein fortification) and (2) determine satiety expectations for these foods as well as intentions to taste and purchase a product with a mixture of dairy and legume proteins.

MATERIALS AND METHODS

The research protocols and consumer recruitment were approved by the Human Ethics Advisory Group of the Faculty of Health Sciences at the National University of Salta, Argentina (Resolution DC-714/19), and the Research Ethics Committee of Brazil (protocol number: 08896919.60.50404).

Participant Recruitment

Participants were recruited via social media invitations providing the link of the questionnaire through Facebook and Instagram. Recruitment was carried out from October 2019 to January 2020. The questionnaire was administered using Google forms (Google+, 2014; https://docs.google.com/forms) in Spanish and Portuguese. The original Spanish version was translated into Portuguese by a native speaker. The average time to complete the full questionnaire was 20 min. For the study, convenience sampling was used because it is a nonprobability technique employed in qualitative research to obtain information about consumer associations (Kinnear et al., 1993).

Stimuli

The FWA technique was employed to investigate perceptions about the verbal stimulus “satiety” and food stimuli composed of 6 concepts of yogurt presented in ascending order of description: yogurt (Y), set yogurt (SY), skim set yogurt (SSY), skim set yogurt with a high content of dairy proteins (SSYDP), skim set yogurt with a high content of legume proteins (SSYPL), and skim set yogurt with a mix of dairy and legume proteins (SSYPD+L). The term “fortified” was not used in case consumers were not familiar with it. Participants were shown cards depicting an image of set yogurt in a typical retail container (unlabeled) with a spoonful of the product held above the container (Figure 1). Each card showed the same image, but the label differed according to the different concepts to be evaluated. The photograph of the yogurt was taken using a high-resolution digital camera (Nikon B500 40x Full HdWifi 16 mp) placed on a tripod at a 25-cm distance. Artificial light was used. Photographs were edited with Adobe Photoshop CS6 software.
Free Word Association Test, Expected Satiation, Taste, and Purchase Intention

The online questionnaire was structured in 4 sections. In the first section, consumers were asked to provide sociodemographic data on gender, age, geographical residence, occupation, working hours, and educational level. In the second section, the FWA test was administered by employing the verbal stimulus “satiety.” The participants were asked to enunciate the first 4 thoughts, beliefs, or memories that came to mind when the stimulus was presented. In the third section, the FWA test was administered using the visual or verbal stimuli of the different types of yogurt. Participants were asked to list the first 4 ideas, memories, associations, or emotions that came to mind when they were exposed to the stimuli. The following statement was used as an example: “When you see a picture of spaghetti, what does it remind you of?” Possible answers could be “with sauce,” “cold times,” “happiness,” and “childhood.” Each card was accompanied by a 9-point categorical scale of expected satiation ranging from 1 = slightly satiating to 9 = very satiating. Consumers were asked to rate the extent to which they expected to feel satiated after consuming the product entirely. For Brazilian consumers, colloquial phrases such as 1 = não mata a fome (it does not satiate) and 9 = mata muito a fome (it satiates a lot) were used for clarification. The fourth section consisted of presenting two 7-point categorical scales ranging from 1 = “I would definitively not taste/not purchase the product” to 7 = “I would definitively taste/purchase the product” for the visual or verbal stimuli SSYPD+L. This study specifically investigated the taste and purchase intention of SSYPD+L, as it is a product with great nutritional benefits based on the use and valorization of legumes, representing a novel food for both the Argentine and Brazilian markets. Knowing the purchase intention for a product with high protein content from a vegetable source also informs the possibility of developing it in the future as a high-protein food with alternative protein sources (Melendrez-Ruiz et al., 2021). Other studies have already investigated consumer perceptions of foods with dairy proteins (Morell et al., 2015a).

Statistical Analyses

Data were analyzed for each country. The information obtained from the Brazilian participants was translated into Spanish. Data on demographic characteristics, frequency of consumption, and associations with the word satiety are expressed in percentage points. Results of the FWA test on the concepts of yogurt were first analyzed by grouping associations with similar
meaning according to category and grouping categories based on dimensions. This work was independently performed by the researchers, who individually interpreted the meaning and synonymy of the words generated. Then, the categories and dimensions obtained by each researcher were compared and unified to continue with the data analysis (Ares and Deliza, 2010; Fiszman et al., 2014). The frequency of mention of each dimension was calculated by counting the number of consumers who had used similar words to describe the different types of yogurt (Gambaro, 2018). To obtain the largest amount of information, 5% frequency of mention for each dimension was considered a cutoff point (de Andrade et al., 2016).

The chi-squared test was used to calculate associations and statistical differences among frequencies of mention for each dimension (Pontual et al., 2017), for each group of participants (Argentinian and Brazilian).

Frequency analysis was applied to each item of the expected satiation scale, and ANOVA and Tukey’s tests were used for continuous data. These analyses were made for each group of participants.

Correspondence analysis was conducted to graphically represent the relationships between the concepts of yogurt, the dimensions emerging from the FWA test, and the results of the expected satiation test. The data from the Argentinian and Brazilian participants were analyzed in a biplot to establish relationships between the information provided by both groups of participants.

Finally, ANOVA with Tukey’s tests were conducted to evaluate differences among intentions to taste and purchase products for each concept of yogurt. All statistical analyses were conducted with Infostat software (Di Rienzo et al., 2017).

**RESULTS AND DISCUSSION**

**Participant Characterization**

**Argentinian Participants.** A total of 298 consumers (87% women and 13% men) participated in the survey. Their age groups were 18 to 28 yr (31%), 29 to 38 yr (46%), 39 to 48 yr (14%), and 49 to 59 yr (7%). A high percentage of consumers who answered the online survey were women. Women are the most likely to participate in online surveys, and they also have a greater ability to verbalize (put into words) their perceptions and feelings (Sosa et al., 2008). Women who are conscious of their food choices spread new habits at home. This tendency is particularly fruitful in research on food perception, as women are mostly responsible for feeding the family (Sosa et al., 2008).

Most of the participants (54%) lived in the northwest of Argentina (comprising the provinces of Jujuy, Salta, Tucumán, Catamarca, La Rioja, and Santiago del Estero), 21% in the Pampean region (Buenos Aires, Santa Fe, Córdoba, San Luis, and La Pampa), and 7% in Cuyo (Mendoza and San Juan) and Patagonia regions (Neuquén, Río Negro, Chubut, Santa Cruz, and Tierra del Fuego). The remaining 8% of the consumers lived in other provinces. The data collected from northwestern consumers’ perceptions are interesting because this region is characterized by traditional food culture based mostly on regional foods, which shapes the acceptance of innovative products. Many studies have been conducted in large cities such as Buenos Aires, where consumer behavior and food culture are influenced by a wider availability of industrial products. Regarding consumers’ occupation, 79% of the participants were employed, with 39% working 31 to 40 h/wk, 15% less than 30 h/wk, and 16% more than 40 h/wk. In addition, 59% of the consumers were students of university programs related to food science. Sex, gender, occupation, and knowledge about foods and their components have an influence on choices toward healthy and unhealthy products (Fiszman et al., 2014).

**Brazilian Participants.** One hundred Brazilian consumers (69% women and 31% men) were recruited. Their age groups were 18 to 28 yr (45%), 29 to 38 (25%), 39 to 49 (22.5%), and older than 49 yr (7%). Sixty percent of the Brazilian participants lived in the state of São Paulo, 12% in the state of Rio de Janeiro, and the remaining 30% lived in other states of Brazil (Brasilia, Ceará, Goiania, Mato Grosso, Maranhão, Minas Gerais, Rio Grande do Sul, Paraná, Pernambuco, Santa Catarina, and Piauí). Seventy-nine percent of the total participants had a job, and 66% were studying food science-related programs. Most of the participants worked between 31 and 40 h/wk (39%), followed by those who worked more than 40 h/wk (16%) or less than 30 h/wk (15%).

**Associations with the Word Satiety**

A total of 889 words were generated by Argentinian consumers when the verbal stimulus “satiety” was presented. Satisfied and full were the terms most often associated with the word satiety, with a frequency of mention of 59 and 55%, respectively. About 24% of the consumers used the expression “without appetite,” 20% associated the word with “satisfied,” and 15% with “pleasure or pleasant.” Mentally working with abstract concepts is usually more difficult than working with objects or actions (Prabhu, 1987). However, participants had a clear mental formation of the word satiety, with
the frequency of mentions of the terms satisfied and full indicating the strength of the association with the verbal stimulus (Guerrero et al., 2010). Associations with the word satiety by Argentinian consumers were more related to the immediate sensation of “stomach fullness” than with the cessation of hunger, as previously described for the European population (Fiszman et al., 2014). It is noteworthy that consumers associated satiety with pleasant sensations, as opposed to results reported for Spanish consumers, who mentioned negative feelings of discomfort after a copious meal (Fiszman et al., 2014). This difference indicates that the amount of food consumed is also a factor associated with the food culture.

Foods such as meat, barbecue, bread, spaghetti, cookies, chocolate, and potatoes were associated with the word satiety by 23% of Argentinian consumers. Among countries globally, Argentina has the fourth highest consumption of meat, with an average of 100 kg/yr per inhabitant (Ritchie and Roser, 2017). The high frequency of meat consumption could have influenced the selection of these products. Studies conducted by Brunstrom et al. (2008) and Fiszman et al. (2014) showed similar results with European consumers, who associated dishes composed of meat and spaghetti as the most satiating foods. In contrast, Buckland et al. (2015) reported that the perception of satiety was negatively associated with the energy density and the fat content of food and that salad and vegetables were considered more satiating items. For Argentinian consumers, particularly those living in the northwestern region, foods with a high content of proteins and complex carbohydrates (starchy foods) were considered satiating food items.

The Brazilian participants mentioned 314 different terms for the word satiety. The words satisfied (16%) and full (30%) had the highest frequencies of mention, as observed in Argentinian participants. Other associations were foods such as rice, pasta, bread, and chocolate. Rice and pasta are also the basis of the Brazilian diet and thus they were associated with satiating food items. Legumes and yogurt were not associated with satiety, despite the high frequency of consumption of these foods among the Brazilian population (Calzada and Treboux, 2019). Meals such as breakfast and lunch were also associated with the word satiety, which denotes the importance of these meals in the Brazilian culture. Protein had a frequency of mention of 3%. Although protein is a recognized source of satiety, consumers in this study, who were generally educated and

| Dimension | Category | Examples of terms included |
|-----------|----------|----------------------------|
| Feelings, emotions, memories, and sensations | Feelings and emotions | I would taste it, taste new things, I would like to taste it, I want to taste, curiosity, fun, happiness |
| | Memories | Family, grandmother |
| | Sensations | Hungry, satisfied |
| Properties and characteristics | Weather/seasons | Fresh, good quality, innovative, original, different, natural |
| | Gymnastics | Cold, hot, snow, winter, spring |
| | Foods | Breakfast, afternoon snack |
| | Places | School, university, work |
| Consumption occasions | Prices | Expensive, cheap, hypermarket, advertising, fashion |
| Brands and prices | Brands | Sancor, La serenisima |
| Sensory characteristics | Texture | Soft, hard, thick, creamy, firm, drinkable, liquid |
| | Flavor | Vanilla, metallic, soft, fruit |
| | Taste | Sweet, less sweet, sour, bitter |
| | Smell | Unscented, strong |
| | Others | Homogeneous, heterogeneous, astringent |
| Healthy food | | Healthy, wholesome, nutritious, health |
| Dietetic food | Nutrients | Protein, calcium, fiber, fat |
| | Nutrition | Diet, gluten free, low calorie, nutritious, medicine, enriched, fortified, supplement |
| Foods | Fruits | Banana, strawberry, red fruits |
| | Cereals | Oatmeal, cereal flakes |
| | Dairy | Milk, cheese, Greek yogurt |
| | Legumes | Bean, lentil, chickpea |
| Liking | Homemade | Tasty, delicious, pleasant |
| Homemade/industrial | Homemade | Homemade, handmade |
| Industrial | Biotechnology, science, experiment, laboratory, invention, ingenious |
| Disliking | Illness | Disgust, horrible, gagging, ugly, I don’t like it |
| Diseases | Intolerances | Allergies, lactose, lactose free |
had a food science background, did not associate satiety with this macronutrient. Instead, Argentine consumers preferred protein-rich foods such as meat, and Brazilian participants preferred meals with a predominance of carbohydrates.

**Associations with Different Concepts of Yogurt**

Table 1 shows the dimensions, categories, and examples of terms associated with 6 concepts of yogurt in Argentina. Twelve dimensions were formed from 28 categories, clustering a total of 4,673 words. Table 2 shows the dimensions associated with different concepts of yogurt in Brazil. Twelve dimensions were formed from 26 categories, which grouped 1,449 words. Four of these dimensions were discarded because they did not reach 5% mention: brand and prices, homemade/industrial, disliking, and diseases/intolerances. The dimension homemade/industrial comprised the terms homemade, biotechnology, science, experiment, laboratory, invention, and ingenious; the dimension disliking comprised the terms disgust, horrible, nausea, ugly, and “I dislike it”; the dimension diseases/intolerances included the terms sick, gastritis, metabolic syndrome, diabetes, allergies, lactose, and lactose-free. Tables 3 and 4 show the frequency of mention for each of the 9 dimensions formed for Argentinian participants and 8 dimensions for Brazilian participants. The information obtained about consumers’ perceptions was practically identical among participants from both countries, except for the terms used in each category. Johansen et al. (2011), in a study with consumers from California, Denmark, and Norway, also reported similarities in motives for choice and perceived healthiness of dairy products, despite differences in the cultural background.

The dimensions associated with the concepts Y and SY were consumption occasions, sensory characteristics, liking, and foods, and the words evoked were delicious, pleasant, and tasty, followed by the dimension of sensory characteristics, such as vanilla, sweet, and creamy. These properties are preferred in yogurt because they generate pleasant sensations, as previously observed in yogurt fortified with milk powder (Morell et al., 2015a). Interestingly, consumers preferred vanilla flavor in yogurt to strawberry or peach, which are usually found in the dairy market.

Consumption occasions and places associated with Y and SY were winter/spring for Argentinian participants, whereas gym/school/university/work and foods such as breakfast and afternoon snacks were associated with these concepts in both countries. Brazilian participants also noted consumption forms such as fast, easy, trans-

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**Table 2. Dimensions, categories, and examples of terms evoked for yogurt concepts of Brazilian participants**

| Dimension | Category | Examples of terms included |
|-----------|----------|----------------------------|
| Feelings, emotions, memories, and sensations | Feelings | Strange, curious, doubt, intrigue, atypical, exotic, curiosity, interesting |
| Properties and characteristics | Gymnastics | Sport, fit, gym, exercise, after training |
| Consumption occasions | Foods | Breakfast, afternoon |
| | Form | Fast, easy, transportable, practical |
| | Places | School, university, work |
| Brands and prices | Prices | Expensive, cheap |
| | Brands | Vigor, Danoninho |
| Sensory characteristics | Texture | Consistent, dense, body, thick, hard, firm, solid |
| | Flavor | Vanilla, soft, good |
| | Taste | Sweet |
| | Smell | Strong |
| Others | Others | Aftetaste |
| Healthy food | Nutrition | Healthy, wholesome, complete, good, beneficial, nutrition |
| Dietetic food | Fruits | Banana, coconut |
| | Dairy | Milk, cheese, Greek yogurt |
| | Dessert | Pudding, flan, ice cream |
| Liking | Homemade/industrial | Delicious, pleasure, rich, yummy, tasty, appetizing, attractive, delicacy |
| | Homemade | Homemade |
| | Industrial | Industrial, artificial, many chemicals, processed, preservative, additives, processed, technology |
| Disliking | Illness | Disgusting, awful, gagging, ugly, dislike, unattractive, not rich, disliked |
| | Digestion | Heavy, not good, bad |
portable, and practical, that is, foods that consumers could eat between meals or “on the go.” Foods associated with these products were fruits in both countries, whereas Argentinian consumers mentioned cereals such as oatmeal and flakes. Brazilian consumers indicated foods such as dessert, including pudding, custard, and ice cream. Feelings, emotions, memories, and sensations included associations with family, especially children, with a strong connotation of family consumption since childhood. Yogurt is consumed mainly by children, while adults do not usually consume it due to lactose intolerance, which affects 50% of South American people (Storhaug et al., 2017). In this sense, yogurt with reduced lactose content and new or regional fruits/cereals could emerge as a product with enhanced sensory properties.

The concepts SSY and SSYDP were associated with the dimension diet food by participants from both countries. In addition, SSYDP was associated with the dimension brand and prices by Argentinian consumers and healthy food by Brazilian participants. Moreover, the concepts of yogurt that indicated industrial modifications (skim or with proteins) were the least associated with the dimensions sensory characteristics and liking. This fact could be attributed to people’s preconception that modified foods have sensory defects of flavor and texture (Ares et al., 2008; Lesme et al., 2020).

The concepts SSYPL and SSYDP+L were associated with the dimension properties and characteristics by participants from both countries, who reported that these products were innovative, new, novel, interesting, and vegetarian food. These associations could be related to the fact that legumes are the basis of a vegetarian diet (Mariotti and Gardner, 2019). In this sense, products fortified with dairy or legume proteins could cover a market segment of the lacto-vegetarian diet. In addition, SSYPL was associated with foods such as bean, lentils, and chickpea by Argentinian consumers. Perceptions about specific low-consumption legumes that are being promoted could be the focus of future research. The dimension feelings, emotions, memories, and sensations was also associated with the concepts of SSYPL and SSYDP+L. Among participants of both countries, these products evoked feelings of curiosity and desire to eat or taste as well as filling or satiating sensations.

### Table 3. Percentage of mention of each dimension for yogurt concepts in Argentinian participants

| Dimension                          | Y   | SY  | SSY | SSYDP | SSYPL | SSYDP+L |
|------------------------------------|-----|-----|-----|-------|-------|---------|
| Feelings, emotions, memories, and sensations | 33.6c | 28.6c | 12.3a | 27.9c | 35.2c | 18.9c   |
| Properties and characteristics    | 21.9c | 12.6b | 7.60c | 23.6b | 26.9c | 9.30bc  |
| Consumption occasions             | 40.9c | 36.5b | 18.3c | 13.0c | 11.0c | 18.9c   |
| Brands and prices                 | 8.00c | 11.0c | 8.60c | 8.00c | 8.30c | 14.3c   |
| Sensory characteristics           | 36.9c | 37.9c | 25.9c | 16.3c | 14.3c | 15.3c   |
| Healthy food                      | 13.6b | 9.30c | 11.0bc | 21.6b | 19.6c | 20.3c   |
| Dietetic food                     | 14.6c | 9.30c | 45.5c | 13.3c | 12.0b | 27.2c   |
| Foods                             | 26.2bc | 20.9b | 7.60c | 12.3a | 9.30b | 10.3c   |
| Liking                            | 25.8c | 23.9c | 8.00c | 13.6b | 6.00a | 7.60a   |

Values followed by different letters indicate statistical differences between columns (P < 0.05).

Y = yogurt; SY = set yogurt; SSY = skim set yogurt; SSYDP = skim set yogurt with a high content of dairy proteins; SSYPL = skim set yogurt with a high content of proteins from legumes; SSYDP+L = skim set yogurt with a mix of dairy and legume proteins.

### Table 4. Percentage of mention of each dimension for yogurt concepts in Brazilian participants

| Dimension                          | Y   | SY  | SSY | SSYDP | SSYPL | SSYDP+L |
|------------------------------------|-----|-----|-----|-------|-------|---------|
| Feelings, emotions, memories, and sensations | 24.5b | 18.4c | 18.4c | 23.5bc | 34.7c | 25.5b   |
| Properties and characteristics    | 7.10c | 5.10a | 9.20c | 14.3bc | 28.6c | 23.5c   |
| Consumption occasions             | 20.4b | 18.1c | 12.2a | 13.3ab | 8.20c | 9.20a   |
| Sensory characteristics           | 49.0c | 49.0c | 46.9c | 35.7a | 31.6c | 39.8c   |
| Healthy food                      | 20.4c | 15.3c | 24.5c | 31.6c | 25.5c | 25.5c   |
| Dietetic food                     | 7.10c | 8.20c | 34.7c | 68.4c | 21.4c | 26.5c   |
| Foods                             | 34.7c | 32.7c | 21.4c | 14.3c | 18.4c | 19.4b   |
| Liking                            | 34.7c | 31.6c | 27.6c | 26.5c | 11.2c | 15.3c   |

Values followed by different letters indicate statistical differences between columns (P < 0.05).

Y = yogurt; SY = set yogurt; SSY = skim set yogurt; SSYDP = skim set yogurt with a high content of dairy proteins; SSYPL = skim set yogurt with a high content of proteins from legumes; SSYDP+L = skim set yogurt with a mix of dairy and legume proteins.
The dimension healthy food was associated with yogurt fortified with proteins, regardless of the protein source. Consumers reported thinking of wholesome and nutritious foods for a healthy lifestyle. Conversely, the concepts Y, SY, and SSY were the least associated with healthy foods. This could be attributed to the concepts including the word protein, which was considered healthier than carbohydrates or fat (Ares et al., 2008).

**Satiety Expectations.** The product with the lowest expected satiety was SSY (Argentinian: 4.39 ± 0.12, Brazilian: 5.02 ± 0.33, \( P < 0.05 \)). For Brazilian consumers, Y was also perceived as a product providing little satiety, possibly explained by associations of skim yogurt with diet food (Fay et al., 2011). No differences were found in the rates for expected satiety in Argentinian participants between Y (4.89 ± 0.11), SY (5.28 ± 0.11), SSYDP (5.11 ± 0.11), and SSYL (5.10 ± 0.12) \( (P < 0.05) \). However, SSYDP+L obtained the highest rate for expected satiety (5.42 ± 0.10) in both Argentinian and Brazilian consumers.

Importantly, when the word protein was used, regardless of the protein source, participants intuited that the product would give them more satiety, especially if it contained a mixture of proteins. Although Brazilian consumers did not associate the word satiety with the word protein, they rated the product with a mixture of proteins as more satiating than other kinds of set-type yogurt. This finding could be attributed to the preconception, or overestimation, of the degree of satiety of yogurt with a high protein content (Buckland et al., 2015). The word set appeared to have a similar effect to that of the word protein. Fiszman and Tarrega (2017) reported that creamy yogurt was associated with higher expected satiety. Morell et al. (2015b) found similar results with dense smoothies. This result was directly related to the importance of texture in the perception of satiety (Hogenkamp et al., 2012; de Graaf, 2012; Nguyen et al., 2017). Some studies reported that people considered solid foods to be more filling than liquid foods (Fiszman and Tarrega, 2017; de Graaf et al., 1992). On the other hand, familiarity with set yogurt influenced the perception of satiety. Brunstrom et al. (2008) found that when the consumer was familiar with the product, other factors such as the protein content had no influence on the perception of satiety. Results indicated that to increase the expectations of satiation of fortified yogurt, a combination of protein sources, as well as texture closer to creamy or set, is important.

**Graphical Representation of Dimensions, Expected Satiety, and Concept Associations.** Figure 2 shows the results of the correspondence analysis in a biplot. The first 2 dimensions explained 83.5% of the data variability, clearly showing the associations described above. The concepts Y and SY were associated with low and intermediate levels of satiety (3–6 points on the scale), and with the dimensions foods, liking, sensory characteristics, and consumption occasions, among Argentinian and Brazilian participants. The associations with the dimensions liking and consumption occasions for Y and SY could be explained by the food familiarity. Familiarity with food products plays an important role in the acceptability to consumers because it decreases the uncertainty associated with the product and generates a better match between expectations and sensory characteristics (Torrico et al., 2019). Moreover, Y and SY were located in the second quadrant of the biplot opposite the concepts formed with words that indicated technological modifications in products (SSY, SSYDP, SSYPL, and SSYDP+L). Modifications referred to the skimming process and the fortification with proteins, which were perceived as less natural products by consumers. The concept SSY was associated with the diet food dimension.

The concepts SSYPL and SSYDP+L were associated with the greatest satiety expectation (level of satiety = 8). The higher expected satiation of these products also evoked pleasant sensations (as described above). In addition, these products were associated with the dimension properties and characteristics by participants from both countries. However, Argentinian consumers perceived these products as “natural and fresh,” whereas Brazilian participants perceived them as “novel, original, and innovative.” Argentinians associated SSYPL with the dimension healthy food. Slight differences in the categories emerged within the 2 groups of consumers, which could serve as a guide to communicating some properties that stand out in future products.

**Taste and Purchase Intentions.** The average score for the intention to taste SSYDP+L yogurt was 5.02 ± 2.20 and 6.04 ± 1.40 for Argentinian and Brazilian consumers, respectively. The higher rate obtained for Brazilian participants could be explained by the fact that consumers reported that it was “original” or “different” (Tables 1 and 2). However, potential Argentinian consumers were indifferent to purchase, as shown by an average score of 4.19 ± 2.09. For Brazilians, the intention to purchase was 5.30 ± 1.72. It is important to note that most of these participants were women studying food science-related programs or had permanent jobs, and it was probably for this reason that the participants from Brazil showed a higher willingness than the Argentinian consumers to taste and buy a new food product. The availability of novel foods in the Brazilian market, the access to food information and their healthy properties, or a combination of these factors could explain the results.
These results indicate that, to increase the purchase intention for a product with dairy and legume proteins combined in the same matrix, it is necessary to provide more information about the benefits of this inclusion.

Finally, the limitations of this study were the relatively smaller number of Brazilian respondents compared with Argentinian participants. It would be interesting to approximate the number of participants in future studies to obtain more information about the perceptions of the Brazilian population. In addition, the perceptions of consumers from other countries regarding high-protein yogurts should also be studied and compared. Research should also investigate the perceptions of Latin American consumers regarding yogurt enriched with other protein sources, such as cereal proteins, that are currently becoming popular. The third limitation of this study is that participants only rated the taste and purchase intentions of yogurt with a mix of dairy and legume proteins. It would be interesting to evaluate these intentions in set and fortified yogurt with dairy proteins to establish comparisons.

The strengths of this study are that we investigated perceptions of a novel yogurt that would likely be sold in the Latin American market as an alternative to existing fortified products. The results will allow appropriate promotional campaigns to be created and consumers to be informed about the beneficial properties of fortified yogurt, which should lead to greater purchase of the product. In addition, few cross-cultural qualitative and quantitative studies have been conducted with Argentine and Brazilian consumers, who represent an important niche to explore owing to their food culture and behavior when purchasing new products.

**CONCLUSIONS**

The results of the present study could have implications for the dairy industry and health authorities, who should communicate the nutritional and healthy properties of novel yogurt fortified with legume proteins. Intrinsic properties, such as the use of different fruits or cereals, creaminess, and sweet or vanilla flavor, should be considered in the product design. Extrinsic attributes, such as the occasions of consumption and the specific market segment, should also be considered. Perceptions about protein-fortified yogurt were similar among participants from Argentine and Brazil. However, Brazilian consumers were more likely to taste and purchase a product with legume proteins.

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