INTENTION TO CONSUME INSECTS AS AN ALTERNATIVE PROTEIN IN FOOD

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Abstract. This study sought to investigate and understand the intention to consume insects of residents in Brazil (N = 510, $\geq$ 18 years) as an alternative protein source. An online survey was developed, consisting of 24 questions, divided into three sections: socioeconomic data; knowledge about entomophagy, and consumption of insects in the human diet. Most respondents (90.78%) declared themselves omnivores and 45.88% claimed that they do not intend to change their meat consumption. Several factors influence consumption, the environmental perspective doing so positively (N = 229) and the consumption eating habits negatively (N = 298), considering that this practice is considered uncommon in the country and most respondents had never consumed insects (77.90%). The most common option for consuming insects was the one that makes them invisible to the naked eye (N = 252). In addition, 32.94% of participants strongly agree with the idea that the preferred way to consume insect-based food would be through the preparation of snacks. Despite these results, most respondents (52.90%) indicated that they might purchase insect-based products if they were available on the market.

Keywords: entomophagy; food neophobia; novel foods; sustainability.

INTENÇÃO DE CONSUMO DE INSETOS COMO PROTEÍNA ALTERNATIVA NA ALIMENTAÇÃO

Resumo. Este estudo procurou conhecer e entender a intenção de consumo de insetos de residentes no Brasil (N = 510, $\geq$ 18 anos) como fonte de proteína alternativa. Uma pesquisa online foi desenvolvida, consistindo em 24 perguntas, divididas em três seções: dados socioeconômicos; conhecimento sobre entomofagia e; consumo de insetos na dieta humana. A maioria dos respondentes (90,78%) se declararam onívoros e 45,88% alegaram que não pretendem alterar o consumo de carne. Diversos fatores influenciam o consumo, sendo de forma positiva a perspectiva ambiental (N = 229) e de forma negativa o hábito de consumo (N = 298), tendo em vista que essa prática é considerada incomum no país e a maioria dos respondentes nunca haviam consumido insetos (77,90%). A opção mais comum para o consumo de insetos foi a que não os torna visíveis a olho nu (N = 252). Além disso, 32,94% das pessoas concordam fortemente que a forma ideal de consumir um alimento à base de insetos seria por meio da preparação de *snacks*. Apesar desses resultados, a maioria dos respondentes (52,90%) indicaram que estão aptos a adquirir produtos à base de insetos caso estivessem disponíveis no mercado.

Palavras-chave: entomofagia; neofobia alimentar; novos alimentos; sustentabilidade.

Keywords: entomophagy; food neophobia; novel foods; sustainability.

1 INTRODUCTION

In recent years, animal protein consumption has increased considerably, and with its growth leads to concerns about animal welfare, global warming, and water scarcity, since the way meat is produced nowadays is resource-intensive and harmful to the environment (Bryant; Barnett, 2020; Ismail *et al*., 2020). Hence, consumers demand the adoption of environmental measures and sustainable strategies, which would allow them to adhere to a diet with less environmental impact. In addition to reducing impacts such as the greenhouse effect, in the future, our current food system is also likely to become unable to feed a growing global population (Lipan *et al*., 2019).

Other factors, such as allergies to animal products or individual ethical choices (vegan, vegetarian, or flexitarian), have aroused the interest of both the consumers and the food industry to examine alternative possibilities of proteins to use in their diet (Bocker; Silva, 2022; Vanga; Raghavan, 2018). Therefore, it is essential not only to adopt a more eco-friendly production of conventionally consumed proteins, but also begin to envision possibilities of alternative proteins. That way, we can contribute to the sustainability of food systems and to biodiversity, and eventually, to a more efficient distribution of high-quality proteins to the entire world population (Aiking; Boer, 2020).

For this reason, extensive research has already been and continues to be conducted on conventional food proteins in an attempt to take advantage of their nutritional and functional properties in food formulation (Gravel; Doyen, 2020). To this end, consumers can vary sources of protein in their diets by, for example, replacing meat with a substitute or by using alternative proteins such as seaweed (Rawwan *et al*., 2022), pea (García-Segovia *et al*., 2020), single-celled beings (Hadi; Brightwell, 2021), cultured meat (Kumar *et al*., 2021), and insect proteins (Gasco *et al*., 2020). These examples are part of the three most important sources of alternative proteins for Sexton, Garnett e Lorimer (2019): cultured meat, plant proteins, and insects.

Insect proteins, particularly, have many favorable attributes, such as being environmentally friendly and presenting high digestibility and nutritional value (Gravel; Doyen, 2020). They are rich sources of protein (20-76 g/100 g of dry basis), have a varied content of fat (2-50 g/100 g of dry basis), carbohydrates (2.7-49.8 mg/ kg of fresh weight), and total fatty acids (up to 70 g/100 g of dry basis), including polyunsaturated fatty acids and minerals, such as calcium, zinc, potassium, iron, manganese, and phosphorus (Kouvrimská; Adámková, 2016).

Despite the benefits, insect production for human consumption presents risks to food safety related to the species used, the substrates, and the accumulation of contaminants in feed and housing materials. Risks include biological (bacteria, viruses, and fungi), parasitic, chemical (mycotoxins, pesticides, toxic metals), and physical contamination (FAO, 2021).

Technologies such as bioengineering, microbial fermentation, and ultrasound extraction are used to produce high-quality insect proteins. However, low consumer acceptance and the lack of specific legislation hinder the sector's development (Sharma *et al*., 2024). As a result, there is a scarcity of data on the production and consumption of insects as human food. It is estimated that approximately 2,111 insect species are consumed in about 140 countries, with entomophagy prevalent in Asia, Africa, Australia, and the Americas (FAO, 2021).

However, compared to meat, market shares of alternative proteins remain low, even considering that supermarkets and restaurants increasingly start to offer alternatives to traditional meat products or dishes (Gravely; Fraser, 2018). This fact may be related to the consumers' resistance to adopting alternative proteins in their diet. Therefore, this study aims to know and understand the intention of Brazil's residents to consume insects (entomophagy) as an alternative protein.

2 METHODS

2.1 Data collection

Online research with exploratory objective and quantitative nature was developed using the Google Forms platform in order to analyze the participants' disposition in relation to entomophagy. The methodology was adapted from the study by Andrews, Nonnecke e Preece (2003). The inclusion criteria required the research participants to be 18 years old or older, reside in Brazil, and sign the Informed Consent Form, a prerequisite for participating in the research. The survey was widely distributed across the country through social media platforms such as WhatsApp, Instagram, and Facebook. The participants voluntarily filled out the questionnaire and received no financial reward. The survey was conducted in January 2023. Of the 513 respondents, 99.41% (N = 510) completed the

survey, and those who either did not complete the survey (N = 03) or failed the validation question were excluded from the study.

2.2 Questionnaire design

The survey consisted of 24 questions divided into three sections: socioeconomic data, knowledge of entomophagy, and consumption of insects in the human diet. The formulation of the questions was based on the studies of Halonen *et al*. (2022), and Hopkins *et al*. (2022).

The first section collected socioeconomic information from the consumer through questions such as: 1. Gender; 2. Age group; 3. Marital status; 4. Place of residence; 5. Education; 6. Monthly income; 7. Adopted diet (omnivore, vegetarian, vegan, carnivore, other) or flexitarian as described by Dagevos (2021); 8. Number and age group (children, adolescents, adults, and the elderly) of household members; 9. and a question about the intention to consume white or red meat in the next few years ('I intend to increase my meat consumption', 'I intend not to change my consumption', 'I want to decrease my meat consumption', 'I can reduce my meat consumption' or 'I do not consume meat').

The second section questioned knowledge of entomophagy: 1. Have you ever heard of entomophagy? ('yes' or 'no'); 2. Have you had experience with insect consumption before? ('I've never eaten an insect', 'I've eaten it once', 'I eat it often', or 'I eat insects occasionally'); 3. Regarding your attitude towards consuming insects and using a five-point Likert scale (where 1 = 'strongly agree', 2 = 'partially agree', 3 = 'neither agree nor disagree', 4 = 'partially disagree', and 5 = 'strongly disagree'), how much do you agree with the following statements: 'I don't think about consuming insects', 'the idea of consuming insects disgusts or repulses me', 'I have nothing against it, but I don't intend to include it in my diet', 'I have the desire to consume insects', and 'I have a positive thought about consuming insects'; 4. How do you think the consumption of new foods can impact the consumption of insects in the future? ('positively', 'negatively', or 'indifferent'); 5. In case you have already consumed a product or recipe that has an insect in its formulation, how was the experience? ('good', 'bad', 'indifferent', or 'I have never consumed insects') and; 6. Would you consider consuming insect-based products? ('yes', 'no', or 'maybe').

In the third section, the following questions addressed the consumption of insects in the human diet: 1. Do you think that the consumption of insects is ethical, in view of the problems related to the creation and production of this type of food? ('yes', 'no', or 'maybe'); 2. What factors positively affect your desire to consume insect-based products? ('the food taste may be interesting', 'environmental perspective', 'price', 'diversification in diet', 'easy domestication of insects', 'greater availability of insect-based foods in markets', 'ethical perspective', 'diversity of products', 'novelty', 'third-party recommendation', and 'other'); 3. And what are the factors that could negatively influence your attainability to consume insect-based products? ('high cost', 'uncertainty about how to use insects as ingredients in food preparation', 'low availability in the market or in restaurants', 'eating habits', 'the diversity of products', 'insects are disgusting', 'taste', 'it may cause me some allergy or indisposition', 'eating insects is unethical', 'health issues', and 'other'); 4. If insect-based products were sold in the market, would you consume them? ('yes', 'no', or 'maybe'); 5. Which conditions would you adopt in order to consume insect-based products? ('insects are grinded and/or pulverized', 'insects are not visible to the naked eye', 'the food is prepared by other people', 'the food tastes familiar', 'the food resembles a familiar food', 'insects do not influence the taste', 'foods that present novelty', 'the food is prepared by me', 'insects are cut in the product', 'insects are whole in the product', 'insects are visible to the naked eye in the product', 'I would not eat food with insects at all'); and 6. Using a five-point Likert scale (where 1 = 'strongly agree', 2 = 'partially agree', 3 = 'neither agree nor disagree', 4 = 'partially disagree', 5 = 'strongly disagree'), of which type of food would you think insects are suitable to be used in the preparation? ('main course', 'starter', 'snack', 'meat substitute', 'plant-based food substitute', 'snack bar', 'gourmet meals', 'processed food', 'pizza', 'soup', 'salad', and 'dessert'). The average time to complete the survey was around 15 minutes.

2.3 Statistical analysis

Data were analyzed using a combination of statistical descriptive techniques (means, frequencies, and percentages) in Microsoft Excel, which included segmentation of participants based on socioeconomic data, knowledge about entomophagy, and consumption of insects in the human diet.

3 RESULTS AND DISCUSSION

3.1 Characteristics of the participants

Among the 510 respondents, 66.10% were women, 33.30% men, and 0.60% identified as another gender. This female majority aligns with findings by Dupont e Fiebelkorn (2020), who noted 57.50% female respondents in a similar study on attitudes toward insect and lab-grown meat in Germany.

Most participants (46.10%) were aged 19 to 30, and 55.50% were single. Additionally, 48.90% of respondents held a graduate degree, suggesting a strong educational background, similar to the demographic in Vartiainen *et al*. (2020), where the average age was 25.2 and over half had a bachelor's or master's degree.

Despite their qualifications, 43.70% of participants reported a monthly income around two minimum wages, indicating potential job competition or unemployment. Since new food products often come with higher prices, this income level may hinder the consumption of innovative foods. The Brazilian Institute of Geography and Statistics (IBGE, 2022b) reported that the average monthly income for individuals aged 14 and older was 2,909.00 reais, slightly above two minimum wages, corroborating the respondents' income data.

The survey found that a significant number of respondents (28.50%) live with two other people, and most households (78.43%) consist of 2 to 4 individuals. The majority of these households are made up of adults over 18, with 442 households having no members under 18 and 397 lacking elderly individuals. This demographic aligns with national statistics, where 68.88% of the Brazilian population is of working age (15 to 64 years) (IBGE, 2023).

While responses came from all five regions of Brazil, the Northeast accounted for a substantial 72.55%, likely due to the researchers being based in Ceará, which is located in that region. This concentration reflects the Northeast's position as the second most populous area in Brazil (IBGE, 2022a) and suggests implications for the acceptance of insect-based diets influenced by regional culture.

In terms of dietary preferences, 90.78% of participants identified as omnivores, with only 0.98% vegan and 1.57% vegetarian, suggesting limited representation of these diets despite 14.00% of the Brazilian population identifying as such (IBOPE, 2018). In addition, 6.67% classified themselves as flexitarians, indicating a tendency to occasionally consume animal protein, which is consistent with findings that approximately 46.00% of Brazilians follow a flexitarian diet (IPEC, 2021).

Egídio e Silva (2022) found similar patterns, with 75.00% of Brazilians eating red meat, 23.10% consuming chicken, and only 1.90% abstaining from all meats. Similar results were found by Palmieri, Nervo e Torri (2023) in Italy, where 68.50% were omnivores, 27.60% flexitarians, while just 3.20% were vegetarians and 0.80% were vegans.

3.2 Intention of meat consumption in the future

Understanding that the consumption of animal protein, especially meat, will be a challenging necessity to fulfill in the future, as it is the demand of a population that tends to increase, the intention of meat consumption in the coming years was questioned. The majority of the interviewed (45.88%) do not intend to change their meat consumption. On the other hand, 25.69% of the respondents indicated that they would like to reduce their meat consumption, ratifying the increase in people who adhere to flexitarianism in the country, 15.88% stated that they may reduce meat consumption, 10.88% intend to increase their meat consumption, and 2.35% do not consume meat.

The study by Niva e Vainio (2021) conducted in 2018 by a commercial marketing research firm in Finland, using an online questionnaire, indicated that only 2.10% of the respondents planned to increase beef consumption in the next 2 to 3 years and 27.30% intended to decrease this consumption. It is observed that these results differ from the present research, inferring that participants are not yet fully adept to this type of change in eating behavior, compared to Finns. Perhaps an incentive to the consumption of alternative sources of protein, or even care for the environment, can lead to an increase in the number of people who intend to reduce their consumption of animal protein in Brazil in the coming years.

3.3 Experience with insect consumption

Regarding the entomophagy experience, while 22.16% of the interviewees stated that they had consumed insects at least once, 77.84% had never consumed them. When asked about entomophagy, 50.98% of the respondents declared knowing the term. Verbeke (2015), using an online questionnaire, investigated the readiness to adopt

insects as meat substitutes by consumers in Flanders and Belgium in 2013. He observed that people who claimed familiarity with the idea of entomophagy were 2.6 times more inclined to take up insects for food than those who said they had never heard of insect consumption. Bisconsin-Júnior *et al*. (2022) suggest that introducing the concept of insect consumption can serve as an indicator of the cultural acceptance of entomophagy, thereby enhancing individuals' willingness to incorporate insects into their diets.

Ribeiro *et al*. (2022) used a questionnaire in two countries - Portugal and Norway - on the acceptability of insects as food and feed. When asked about the consumer experience, while 22.30% of Norwegians answered yes, 77.70% answered no, in Portugal, while 4.30% of the respondents had consumed insects, 95.70% had not. In Finland, only 7.00% of respondents indicated to have already consumed insect-based products (Niva; Vainio, 2021). In Australia, 64.60% of respondents indicated that they had never consumed insects (Hopkins *et al*., 2022). These results are like the present study (77.90%), indicating that the consumption of insects has not yet been fully accepted in some parts of the world.

In Japan, in an online survey conducted by Sato e Ishizuka (2023), found that more than half of the respondents had eaten insects, 52.00% in the Kanto area and 81.80% in Nagano. This result is associated with the traditional Japanese culture of consuming wild insects such as rice grasshoppers, wasp litters, hornets, silkworms, and cicadas, first reported in the XVII century and continuing to this day (Poma *et al*., 2021).

In the present study, when asked about their experience of consuming foods that have insects in their formulation, 12.70% reported that they had a good experience, 9.60% stated that it was an indifferent experience, and only 2.10% described it a bad experience.

Woolf *et al*. (2019) evaluated the willingness of Americans to consume insects through an online survey and obtained results similar to the study in question. Among the 397 participants, a total of 74.10% had never consumed insects. Of the 25.9% of respondents who had consumed, 16.50% reported having had a terrible experience, 12.60% considered it a bad experience, 31.10% were neutral or indifferent, 26.20% reported having had a good experience, and 13.60% a very good one.

One way to arouse people's interest in consuming insect-based products is to use appropriate marketing, aimed at increasing the acceptability of this type of product. Pozharliev *et al*. (2023) address this in their study with two examples of actions that can reduce repulsion towards entomophagy: by removing the image of insects from packaging, whether real or not, entomophobia is reduced (fear or an excessive aversion to insects) and increase the desire to try the product is increased; and raising consumer awareness of the health benefits that different types of insect-based foods can provide.

3.4 Insect consumption intention

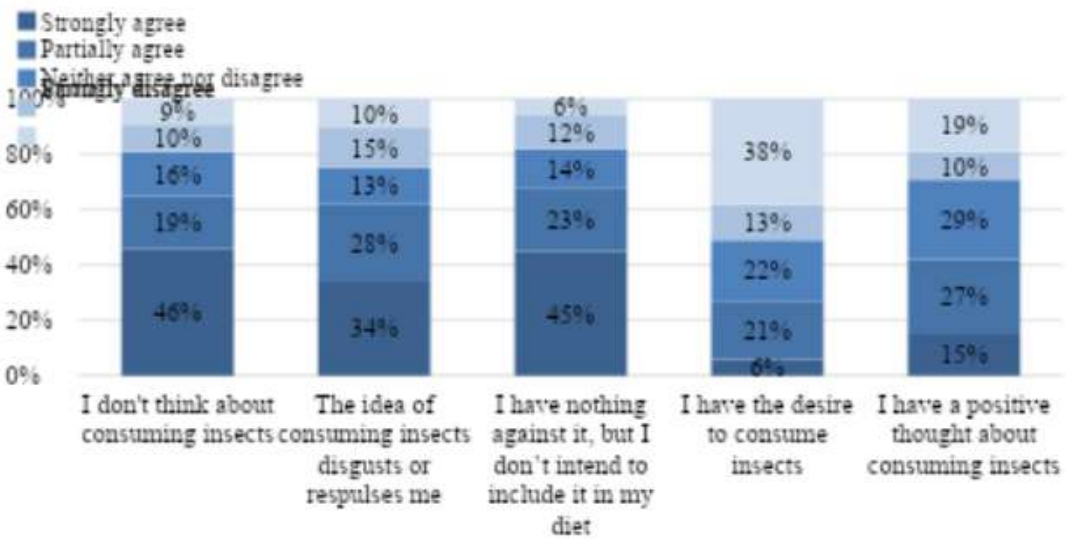
The results of consumption intention show that 29.00% neither agree nor disagree that they 406 have positive thoughts about the consumption of insects; 38.00% strongly disagree that they 407 have a desire to consume insects; 45.00% strongly agree that they have nothing against it, but 408 do not intend to include it in the diet; 34.00% strongly agree that the idea of consuming insects 409 causes them disgust or repulsion; and 46.0% strongly agree that they do not consider 410 consuming insects. It can be inferred that almost half of the interviewees (46.00%) are not 411 interested in introducing insects into their diet (Figure 1).

Tuccillo, Marino e Torri (2020) conducted an online questionnaire to assess the attitudes of Italian consumers towards entomophagy. Among the 400 respondents, 21.80% indicated a desire to eat insects whereas, in the present study, only 6.00% strongly agreed with having a desire to consume insects, and 21.00% partially agreed.

This variation in attitudes towards consuming insects may differ between regions within the same country and, especially, between different countries.. According to several studies, this variation is related to both entomophobia, as some still perceive insects as pests, and to the place where the research is conducted, since in some countries such as Thailand, China, and Mexico, entomophagy is common (Sogari *et al*., 2023; Stone *et al*., 2022; White *et al*., 2023).

It has been reported that, due to the positive sensory responses developed when consuming insects, individuals who consume or have consumed them are more predisposed to eat and buy insect-based products than those who have never experienced insects (Hartmann; Siegrist, 2016; Mancini *et al*., 2022).

Figure 1: Insect consumption intention



3.5 Impact of the emergence of new foods on insect consumption

When asked how new foods impact the consumption of insects, 54.90% of the respondents stated that this trend has a positive impact on human food, 8.00% believe it has a negative impact, and 37.10% are indifferent to this event.

Malek e Umberger (2023) in a study carried out in Australia, they report that there is consumer interest in a variety of alternative protein products, corroborating the findings of the present study, which indicate that these new foods have a positive impact on entomophagy (54.90%).

When asked if they would consume insect-based products, 42.80% stated that they were unsure (maybe), 33.70% would not consume them, and 23.50% would. In the study by Reed *et al*. (2021), approximately one-third (32.00-37.00%) of the American individuals questioned were willing to consume products made from cricket powder. The consumption of animals is still quite controversial, with three factors directly associated with insect-based diets: disgust or repulsion, social influence (a process by which someone's behavior changes due to others), and moral concern (the ethical implications of harming insects for food production), as reported by Russell e Knott (2021) in their study in the United Kingdom.

When it comes to animal welfare or moral concerns, as previously reported, the key piece is the ethical issue. In the present study, when asked if the consumption of insects is ethical, 52.35% of the respondents answered yes, while 11.37% answered no. According to Hadi e Brightwell (2021), population growth and climate issues, especially anthropogenic emissions of greenhouse gases released by livestock, as well as the dense use of soil and water for animal husbandry, have strongly impacted the emergence of new alternative proteins that replace conventional meat, and one of these alternatives is insects.

3.6 Factors influencing insect consumption

Regarding the factors that positively affect the respondents' desire to consume insect-based products, it was observed that the environmental perspective was considered the most important (229 answers) (Table 1).

Studies indicate that livestock farming adversely affects the environment, food security, and animal welfare, leading to growing public concern (Michel; Begho, 2023; Takeda *et al*., 2023). In this context, eating habits were the most significant barrier to consuming insect-based products, with 298 responses, followed by uncertainty about their use in food preparation (257 responses). Given that insect consumption is uncommon in Brazil and often viewed as a taboo, this result was expected. Moreover, the National Health Surveillance Agency (ANVISA) has yet to regulate insects for human consumption, unlike some countries in the EU, Canada, and the U.S.

Table 1: Factors that positively and negatively affect the desire to consume insect products.

	Order of importance *(1 = more important, 10 = less important)*
Positive factors	
1. Environmental perspective	229
2. Novelty	197
3. Diversification in diet	173
4. Food taste can be interesting	162
5. Product diversity	136
6. Price	132
7. Increased availability of insect-based foods in the market	100
8. Ethical perspective	71
9. Third-Party recommendation	54
10. Easy domestication of insects	46
Negative factors	
1. Eating habits	298
2. Uncertainty in how to use insects in food preparation	257
3. Flavor	223
4. Insects are disgusting	215
5. It can cause me allergy or malaise	184
6. High cost	162
7. Low availability in the market	114
8. Health issues	112
9. The diversity of products	30
10. Consuming insects is unethical	23

A South Korean study identified sanitation as the primary factor for accepting insect-based foods, followed by safety and taste (Lee; Bae, 2023). In this study, taste ranked third, with 223 responses, reinforcing its importance in food acceptance.

When asked about purchasing insect-based products if available, 52.90% of respondents expressed potential interest, 31.20% would not buy them, and only 15.90% were certain they would. A Finnish study found 44.00% were likely to consider insect products, while 39.00% would buy them (Vartiainen *et al*., 2020). In a separate study by (Egídio; Silva, 2022), 42.30% expressed possible interest in purchasing these products.

Kuff *et al*. (2023) assessed the influence of country-of-origin labeling on consumption intentions, revealing a preference for U.S.-produced cricket flour over that from China, reflecting the impact of national image on consumer choices.

3.7 Conditions and types of products suitable for the use of insects

Table 2 shows the results of the question about which conditions the respondents would adopt to consume insect-based products.

As mentioned by Wendin e Nyberg (2021), and observed in this study (Table 1), the environmental perspective is a determining factor for the acceptance of entomophagy, although it is not the main reason for adopting the practice. The acceptance of insects as human food is complex and includes other factors such as disgust, neophobia, and familiarity. The present study noted that the lowest number of responses was for products in which the insects are visible (N = 15) The authors mention that exposure and positive tasting experience are important for accepting insects as food.

Table 3 shows the suitability of using insects in the composition of different types of human food according to respondents.

Snacks are convenient, ready-to-eat products often consumed between meals. They are frequently enhanced with powders or flours to increase their protein content. Insects, such as crickets and grasshoppers, are ideal for

Table 2: Conditions adopted for the consumption of insect-based products.

Order of importance *(1 = more important, 11 = less important)*	
1. If insects are not visible to the naked eye	252
2. If insects are ground and/or pulverized	192
3. If the food tastes familiar	190
4. If the food looks like a familiar food	183
5. If the insects do not influence the flavor	167
6. If the food presents novelty	93
7. If the food is prepared by someone else	81
8. If insects are presented in cut form	30
9. If the food is prepared by myself	24
10. If insects are visible to the naked eye	20
11. If insects are whole in the product	15

Table 3: Types of foods that are suitable to have insects in their composition.

Food where insects could be used	**I strongly agree**	**Partially agree**	**Neither agree nor disagree**	**Partially disagree**	**I strongly disagree**
Dessert	8.43%	13.33%	29.22%	10.00%	39.02%
Pizza	9.41%	14.31%	31.38%	11.96%	32.94%
Main dish	9.61%	19.22%	29.41%	12.74%	29.02%
Soup	11.95%	20.00%	27.65%	10.20%	30.20%
Plant-based food substitute	12.35%	20.20%	31.37%	10.98%	25.10%
Salad	12.55%	19.22%	31.17%	9.61%	27.45%
Meat substitute	15.29%	23.14%	24.90%	10.00%	26.67%
Gourmet dining	20.78%	22.35%	27.45%	5.69%	23.73%
Processed food	23.14%	25.68%	23.53%	5.10%	22.55%
Entry	23.33%	26.47%	21.96%	7.65%	20.59%
Bar snack	23.73%	27.45%	21.18%	6.86%	20.78%
Snack	32.94%	26.47%	18.04%	3.92%	18.63%

this purpose due to their high protein content, which can reach up to 77% on a dry basis. Additionally, they provide essential minerals, vitamins, amino acids, and lipids Azzollini *et al*. (2018), Cicatiello, Vitali e Lacetera (2020). Besides, snacks appeal to consumers who seek ready-to-eat options and want avoid visible insects, as insect flour is commonly used in formulations (Gmuer *et al*., 2016; Severini *et al*., 2018).

This study highlights the behavior of participants in relation to the consumption of insects in their diet, presenting the possible ways in which insects are consumed. Insects have become one of the main focuses of study when it comes to researching unconventional sources of protein. With the global demand for protein increasing due to population growth, there is a need to develop new sources and identify more environmentally sustainable production conditions.

Encouraging insect consumption requires various approaches due to the many factors influencing this intention. In Brazil, where there are no regulations for the reproduction, preparation, and sale of insects for human consumption, establishing norms is crucial for consumer safety and promote production (Tunes, 2020). Cultural aversion towards insect consumption persists due to the lack of tradition in using this protein source, influenced by neophobia. However, some indigenous tribes in Brazil use insects for medicinal purposes or associate them with folklore (Schardong *et al*., 2019)).

4 CONCLUSION

In conclusion, the research indicates that most participants, while identifying as omnivores and not intending to change their meat consumption, are open to purchasing insect-based products. Although many people are familiar with the term entomophagy, only a few have tried eating insects. Those who did, report positive experiences.

The majority of respondents were female, and a notable number expressed intentions to reduce red meat consumption, suggesting a potential market for insect-based foods. However, there remains a general non-acceptance of whole insect foods. Consumers are more inclined to accept insect products where the insects are not visible, such as snacks or pizzas.

The study has some limitations. These include a bias towards responses from areas near the researchers' location due to the online format, as well as a lack of qualitative data that could enhance our understanding of participants' perspectives. Nonetheless, the study successfully achieved its objective by providing an exploratory quantitative analysis of the factors influencing the acceptance of insect consumption in Brazil.

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