

ROMANIAN CONSUMER ATTITUDES REGARDING ALTERNATIVE PROTEIN SOURCES

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Abstract

By 2050, the global population is set to reach 9.8 billion, which means high food demands. Therefore, the necessity of using alternative protein sources for food development, instead of meat, is of great interest. Meat alternatives which are generally based on proteins that are not of animal source present chemical characteristics very similar to animal protein and they intend to present same flavour, texture and appearance. These types of proteins are gaining more attention due to their health benefits, sustainability from an environmental point of view and ethics. Their sources are of plant origin (edible seeds, cereals, pseudo-cereals, tubers, legumes), microorganisms (bacteria and fungi), unconventional alternative sources (by-products of agro-industrial processes), algae, microalgae and insects. This study aimed at presenting consumer attitudes and perceptions related to alternative protein sources, and in this respect, a questionnaire was developed and distributed to be completed on-line. The results of our study showed that consumers are not totally informed about alternative protein sources and the majority are reluctant to some of these sources, but a small percent would be willing to pay more and consume alternative protein-based products.

Key words: alternative protein sources, consumer attitude, questionnaire.

INTRODUCTION

In the last years, the number of studies related to the use of alternative proteins in human nutrition has increased. Among the reasons cited in terms of supporting the development of alternative sources of protein are demographic growth and limited resources along with degradation of environmental protection, deterioration of animal welfare, increase in flexitarianism and human health reasons. Lately, the increase of human population numbers and depletion of natural resources have become among the most critical issues to be faced worldwide (Quintieri et al., 2023). Regarding the demographic growth, United Nations reports that the current world population comprises 7.5 billion people and is foreseen to increase up to 9-10 billion by 2050 (United Nations, 2019), which will require the meat industry to increase production by 50–73% to meet the growing food demands (Bonny et al., 2017). With respect to degradation of environmental protection, many studies argue that animal agriculture emits

greenhouse gases such as carbon dioxide, methane and nitrous oxide respectively (Takefuji, 2021). Their emissions account for 14.5% of total emissions, including those of other sectors, indicating that animal agriculture is a contributor to global warming (FAO, 2017). Also, in recent times entire areas on Earth have faced very long periods of drought, water being a very important resource in raising animals and also being known that for every kilogram of livestock meat grown, water of 20.7 tons is required for beef, 5.9 tons for pork and 4.5 tons for poultry for every kilogram of feed crops (Oki et al., 2003). Alternatives and cultured meat, are generally considered to be healthier and more environmentally friendly than traditional animal-derived proteins (Aiking, 2011). That being said, the benefits of alternative protein production have not yet been fully scientifically documented, particularly with respect to the environment (Onwezen et al., 2021).

Flexitarianism, or "occasional vegetarianism", is an increasingly popular plant-based diet that claims to reduce carbon footprint and improve

health through a diet that is mostly vegetarian but still allows for occasional consumption of meat (Delaney, 2018). For those who want to adopt this diet, meat alternatives are welcome. In terms of aspects related to human health, it is well known that excessive consumption of meat and meat products is often associated with overconsumption of energy and fat, resulting in excess weight, obesity and an increased risk of chronic diseases, such as cardiovascular disease and type 2 diabetes. In addition, certain components of fresh and processed red meat may further increase the risk of these diseases and predispose the consumer to cancer, particularly colorectal cancer (Salter, 2018). Gravely and Fraser (2018) stated in a study that in comparison to meat, the market shares of alternative proteins remain low, even despite the fact that super-markets and restaurants increasingly offer alternatives to traditional meat products or dishes, such as plant-based burgers or wraps with beans (Curtain and Grafenauer, 2019). The growth of plant-based meat market is projected to increase from \$4.6 billion in 2018 to \$85 billion in 2030 (UBS, 2019) and, as a milestone by year 2026, reach \$30.9 billion (Watson, 2019). This new market appears to be well positioned for further expansion and innovation.

In this context, the aim of the present study was to assess the familiarity level of Romanian consumers with alternative sources of protein, such as vegetable protein, edible insects, algae and laboratory-grown meat. Also, the authors of this study wanted to obtain a detailed picture of consumer preferences and attitudes regarding the use of alternative protein sources in their own diet in order to identify key barriers and opportunities in their adoption, as well as their concerns regarding the impact of meat consumption on the environment.

MATERIALS AND METHODS

In order to investigate consumer attitudes towards alternative protein sources a survey in form of an online questionnaire was designed and uploaded on "Google Forms" platform, this being distributed in the online environment on different social networks, in order to collect responses covering a diverse sample of

consumers of different ages, genders and education levels.

The questionnaire has a short completion time of several minutes and consists of a small number of logical questions that aim to provide information about buying habits, preferences, behaviour and even the profile of consumers (Colibaba, 2001). The questionnaire contains 26 questions, strategically designed to explore different aspects of consumer acceptability. A number of 20 questions were included in the questionnaire regarding respondents' knowledge and information about alternative protein sources, their personal preferences regarding these sources, their eating habits, their motivations and concerns related to their consumption, as well as factors that could influence the decision to adopt or reject alternative protein sources, but also 6 other questions aimed at collecting socio-demographic information such as: age, gender, income, environment from which they come, etc. The questions are closed, simple, clear, some with a single answer and others with multiple answers.

RESULTS AND DISCUSSIONS

This study was conducted in 2023 and following the completion of the questionnaire a total sample of 178 answers was gathered, from which 71.9% were women and 27% men, while 1.1% preferred not to declare their gender. Regarding the age of the participants in this study, 51.7% are between 18-25 years old and 20.8% are between 26-35 years old. Respondents aged 36-45 years, as well as those aged 46-60 years presented equal percentage, namely 12.9%, while respondents over 60 years old represent 1.7%. The majority of the respondents were employed (73%), while another important part of them were students (18.5%). Other respondents were entrepreneurs (3.4%), pensioners (2.8%) and unemployed people (2.2%). Regarding the monthly income, 49.4% have between 2500 - 4500 RON, 27.3% have low incomes below 1500 RON and 23.32% of consumers earn more than 4500 RON per month. The education level was of 52.2% for higher education graduation, 27% graduated high school, 16.9% graduated a professional school, while 2.2% graduated

primary school, respectively 1.7% graduated secondary education school. Further, 87.6% of the respondents mentioned they live in urban

areas, and 12.4% represent the number of those from rural areas. The socio-demographic profile of the respondents is presented in Table 1.

Table 1. The socio-demographic profile of the respondents

Age group	51.7% - 18-25 years 20.8% - 26-35 years 12.9% - 36-45 years 12.9% - 46-60 years 1.7% - more than 60 years
Gender	71.9% - female 27% - male 1.1% - preferred not to declare their gender
Highest level of education completed	52.2% - University 27% - High school 16.9% - Professional School 2.2% - Primary education School 1.7% - Secondary education School
Professional status	73% - employed 18.5% - student 3.4% - entrepreneur 2.8% - pensioner 2.2% - unemployed
Where do you live?	87.6% - urban area 12.4% - rural area
Household's monthly net to income	49.4% - between 2500 - 4500 RON 27.3% - below 2500 RON 23.3% - over 4500 RON

Table 2 shows the answers that reflect the probability of the respondents to pay more for alternative proteins than for animal protein, or adopt the long-term consumption of these alternative proteins in their diet. Therefore,

16.4% are very likely to pay more for alternative proteins than for traditional animal-based proteins, while 36.7% are somewhat likely, 33.9% are not very likely and 13% are not likely at all to pay more for these products.

Table 2. The probability to pay more for alternative proteins or to switch the diet to these for a long-term period

Question	Answers*			
	Very likely	Somewhat likely	not very likely	not likely at all
How likely are you to pay more for alternative proteins than you would for traditional animal-based proteins?	16.4%	36.7%	33.9%	13%
How likely are you to switch to alternative protein sources as your main long-term protein source?	6.8%	23.7%	50.8%	18.6%

* - % of respondents

The outlook on transitioning to alternative protein sources in the long term varies among respondents. When asked how likely they are to make this transition, the results indicate that a small sample, namely 6.8% of respondents, say they are very likely to make this transition. At the same time, 23.7% indicated that they are somewhat likely to adopt alternative protein sources in the long term. However, the majority of respondents, representing approximately 50.8%, indicated that they were not very likely

to make this transition, and 18.6% indicated that they were not at all likely to do so.

A series of decisive factors in choosing the consumption of alternative protein were analysed considering their degree of importance for respondents and the results obtained are presented in Table 3. It seems that taste is very important for consumers, influencing their purchase decision, thus 33.9% of the respondents consider the taste similarity between the alternative protein and traditional

animal – based products to be very important, while 34.5% consider this issue somewhat important, 20.3% not very important and only 11.3% not important at all. Further, 27% of respondents consider that, in the case of alternative protein, texture is very important to be similar to traditional animal – based products, while 37.1% consider to be somewhat important, 20.8% not very important and 15.2% not important at all. People are willing to buy alternative protein products if they are available at the store/in the restaurants, etc., thus 49.7% of respondents consider very important the

availability of this products, while 37.5% consider it somewhat important, 10.2% not very important and 5.6% not important at all. For the majority of consumers, the high protein content of alternative protein products matters, thus 27.1% consider it very important, 46.3% somewhat important, 16.9% not very important and 9.6% not important at all (Table 3). The costs of alternative proteins should reflect their quality and should be correct, thus 33.2% consider it very important, while 37.1% is somewhat important, 18.5% not very important and 11.2% not important at all (Table 3).

Table 3. The degree of importance of some decisive factors in choosing the consumption of alternative protein

Question	Answers*			
	Very important	Somewhat important	Not very important	Not important at all
How important is it to you that alternative protein taste similar to traditional animal products?	33.9%	34.5%	20.3%	11.3%
How important is it to you that alternative protein have a similar texture to traditional animal protein?	27%	37.1%	20.8%	15.2%
How important is it to you that alternative sources of protein are easily accessible (eg, available at grocery stores, restaurants, etc.)?	49.7%	37.5%	10.2%	5.6%
How important is it to you that alternative sources of protein have a high protein content?	27.1%	46.3%	16.9%	9.6%
How important is the cost of alternative proteins to you?	33.2%	37.1%	18.5%	11.2%

* - % of respondents

The majority of the surveyed consumers stated that they consumed alternative sources of proteins (88.2%), they heard about insect-based protein as an alternative source of protein (66.9%), but they don't want to try them (52.2%), also they have information and heard of cultured meat (64%), but they are reluctant in terms of its consumption (53.9%). Therefore,

27%, respectively 24.2% of respondents are not sure that they want to consume insect-based protein respectively cultured meat as an alternative protein source. The results reflected the fact that 51.1% of the respondents never thought about the environmental impact of consuming traditional meat products (Table 4).

Table 4. Denying/Affirming the information about alternative proteins and the availability to consume them

Question	Answers*		
	Yes	No	I am not sure
Have you ever consumed alternative sources of protein such as legumes (peas, chickpeas, beans, etc.), plant-based proteins (ex: soy, tofu, etc.), algae, insect protein, or lab-grown meat?	88.2%	11.8%	-
Have you ever thought about the environmental impact of consuming traditional meat products?	48.9%	51.1%	-
Have you ever heard of insect based protein as an alternative source of protein?	66.9%	33.1%	-
Would you be willing to try insect-based protein?	20.8%	52.2%	27%
Have you ever heard of cultured meat (also known as lab-grown meat)?	64%	36%	-
Would you be willing to try cultured meat as an alternative protein source?	21.9%	53.9%	24.2%

* - % of respondents

In this study, the authors wanted to determine the frequency with which people consume animal protein products or alternative protein sources. The obtained results revealed that only 14.1% of respondents use to consume daily alternative sources of protein, while 33.9% use to consume it a few times a week, 27.7% a few times a month, respectively 19.2% rarely and 5.1% never. Regarding how often the consumers use to eat traditional meat products, the results recorded a daily consume in the case of 29.8% of respondents, while 58.4% use to consume a few times a week this category of products, respectively 8.4% a few times a month, 2.2% rarely and 1.1% never (Table 5).

Table 5. The frequency of alternative protein consumption versus animal protein

Question	Answers*				
	Daily	A few times a week	A few times a month	Rarely	Never
How often do you consume alternative sources of protein?	14.1%	33.9%	27.7%	19.2%	5.1%
How often do you eat traditional meat products (beef, chicken, pork, etc.)?	29.8%	58.4%	8.4%	2.2%	1.1%

* - % of respondents

Regarding the alternative proteins that Romanians are used to consume, the questionnaire provided a question with multiple answers, and the collected data mostly count legumes (93.3%), respectively plant based-proteins (52.1%), at the opposite pole, being seaweed consumption (11.7%), respectively insect proteins (1.2%) and cultivated meat (0.6%), as shown in Figure 1.

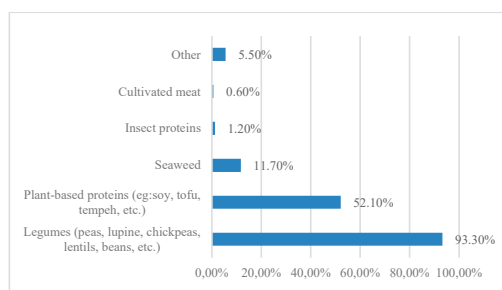


Figure 1. The chosen alternative proteins of the respondents

Consumers who answered that they did not consume alternative proteins until now were asked what was the main reason for this choice (Figure 2).

Thus, it seems that the main reasons were the lack of availability (11.4%), different concerns about taste (27.8%) and the lack of interest (21.5%). Among other reasons why some consumers were not tempted to try alternative proteins are health issues (10.1%) and other personal opinions and reasons (29.1%).

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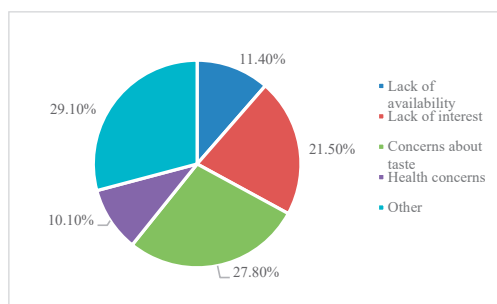


Figure 2. The main reason the consumers did not tried alternative proteins

Onwezen et al. (2019) show that affective drivers are more relevant for innovative alternative proteins of insects and seaweed (compared to less innovative alternative proteins of pulses and fish), indicating that acceptance of innovative alternative proteins is based more on feelings than the acceptance of less innovative alternative proteins is.

Among the reasons listed by reluctant consumers regarding what could motivate them to try alternative protein sources is counted curiosity (33.5%), health issues (31.2%), animal welfare concerns (20.2%), environmental concerns (12.7%) and other personal reasons (31.2%) (Figure 3).

The acceptance of all alternative proteins is affected by food neophobia - which is defined as being the aversion to trying novel foods, and is a key barrier for the consumption of insects (Onwezen et al., 2021).

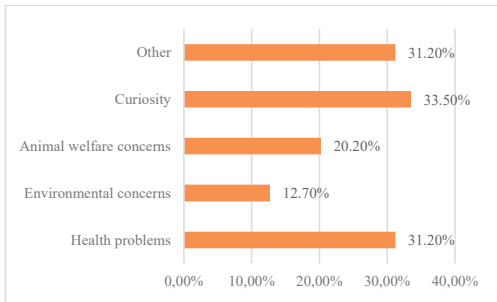


Figure 3. What motivates you to try alternative protein sources?

All respondents were asked in what form would alternative sources of protein be more appealing to incorporate into their diet, and the data collected highlighted that consumers prefer protein bars (52.3%), burgers (34.3%), chips (30.2%), flour (20.9%) and other categories of products (25.6%) (Figure 4).

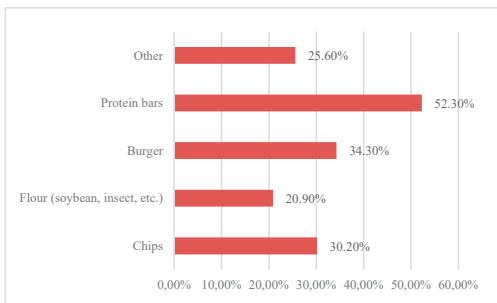


Figure 4. In what form would alternative sources of protein be more appealing to incorporate into your diet?

The world is currently facing the challenge of satisfying the food needs of a growing population, without consuming excessive natural resources, or extensively the ecological environment beyond repair (Zhang et al., 2021). Regarding the level of concern about the impact of animal husbandry on the environment, the largest share, 41.8% of the respondents, stated that they show a moderate concern regarding this aspect, 29.9% indicated a level low level of concern, while 7.9% chose the option "very concerned" and 1.1% indicated the highest level of concern, "extremely concerned". On the other hand, 19.2% of respondents chose the "not at all concerned" option, signifying a lack of awareness of the impact of animal husbandry on the environment (Figure 5).

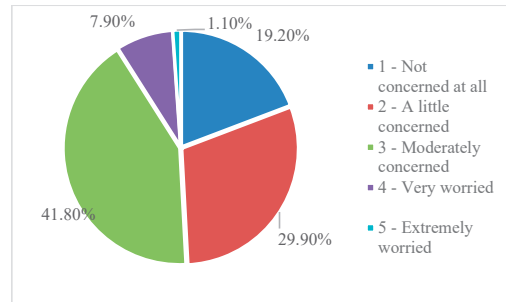


Figure 5. The concern of the respondents regarding the impact that raising animals have on the environment

Environmental impact and concerns about maintaining a healthy lifestyle are important factors in consumers' decision to adopt alternative protein sources. Awareness of the consequences of meat and dairy production has led to an openness to alternatives that reduce the ecological footprint.

CONCLUSIONS

The responses received from all the participants to this study were analysed and interpreted in this paper, with the aim of drawing relevant conclusions and gaining a clearer understanding of the determinants of protein consumption from alternative sources. Information and education are key in promoting alternative proteins, as consumers need clear and accessible knowledge of the benefits and options available so they can make informed decisions and adopt these alternatives consciously. Identified advantages of alternative protein sources include their high protein content, comparable to traditional products, but with reduced environmental impact and sometimes additional health benefits. Disadvantages identified include possible differences in taste and texture compared to traditional products, as well as the higher costs associated with alternative proteins. These aspects may represent obstacles to the long-term adoption of a diet with alternative protein sources and require continued development to provide more affordable products with a similar sensory experience. In conclusion, this paper highlighted an increase in consumer interest and positive attitude towards alternative protein sources, particularly in terms of environmental

impact. However, continued efforts are needed to improve the acceptance and adoption of alternative protein sources through innovations in product development, affordable pricing policies, and ongoing consumer information and education.

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