

# The openness to meat substitutes among hobby runners in Hungary and their consumption habits

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## Abstract

The rise in global meat consumption poses significant sustainability challenges, driving the exploration of alternative protein sources. This study investigates consumer attitudes towards meat alternatives, including plant-based options, lab-grown meat, and insect-based foods, among physically active individuals. Using an online survey disseminated through running communities, data from 876 hobby runners were analysed through SPSS (Statistical Package for the Social Sciences) with descriptive and comparative statistics. Results indicate that while meat consumption remains prevalent, there is a growing awareness of plant-based options; however, lab-grown meat and insect-based foods face greater scepticism. The findings contribute to understanding the role of sustainable food choices and offer recommendations for promoting meat alternatives in the evolving food industry.

**Keywords:** sustainability, meat alternatives, consumer attitudes, plant-based foods, food trends, healthy lifestyle

**JEL Classification:** D12, M31, Q01, Q56, O33

## Introduction

The global population is steadily increasing, and according to United Nations estimates, it may reach 10.3 billion by 2084 (United Nations, 2024). Feeding this growing population and meeting the rising demand for meat represent major challenges for the food industry. Although a modest decline in meat consumption, particularly red meat, can be observed in the Western world, this trend is insufficient to offset the overall increase in global demand and rising levels of prosperity worldwide. For instance, in Germany, official statistics show that per capita meat consumption fell by approximately 3% (2.5 kg per person per year) between 2020 and 2021 (BLE, 2022). Similarly, the United Kingdom recorded an 11.2% decline in meat consumption between 2019 and 2022 (DEFRA, 2022). In developed countries, the decline in red meat consumption is primarily driven by health, ethical, and environmental concerns (OECD–FAO, 2020). Nevertheless, with rising global affluence, meat is no longer considered a luxury item for many social groups, especially in developing regions (Chemnitz & Becheva, 2022).

In light of global population growth, food security challenges, and sustainability considerations, the exploration of alternative protein sources to replace animal-based proteins has become one of the most pressing issues in contemporary food science and policy. Conventional meat production imposes significant environmental burdens on ecosystems, including greenhouse gas emissions, increased water and land use, and the spread of antimicrobial resistance (Alexandratos & Bruinsma, 2012; Gerber et al., 2013; IPCC, 2022; OECD–FAO, 2020; Poore & Nemecek, 2018; Ritchie et al., 2021; Van Boeckel et al., 2015). Livestock farming plays a substantial role in global greenhouse gas emissions and resource use, thereby contributing to climate change and environmental degradation. According to the Food and Agriculture Organisation (FAO), the livestock supply chain accounts for approximately 14.5% of total anthropogenic greenhouse gas emissions (Gerber et al., 2013). Furthermore, the

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latest IPCC (Intergovernmental Panel on Climate Change) report indicates that the AFOLU sector (Agriculture, Forestry, and Other Land Use) accounts for approximately 22% of global emissions (IPCC, 2022). In this context, there is an urgent need to develop more sustainable food systems, with a particular emphasis on the partial replacement of animal proteins. Recent research and industrial innovation have identified three promising categories of alternative protein sources: plant-based meat substitutes, lab-grown (cultured) meat, and edible insects.

### **Theoretical background**

Onwezen and colleagues (2021) identified five main types of alternative proteins that consumers might choose as substitutes for conventional meat: legumes (e.g., beans and lentils), algae, insects, plant-based meat alternatives, and cultured meat. Among these, insects had the lowest level of consumer acceptance, followed by cultured meat. Legumes and plant-based proteins were the most widely accepted.

Plant-based meat alternatives are foods made from plant ingredients (e.g., grains, legumes) that aim to replicate the texture, flavour, and nutritional content of conventional meat as realistically and comprehensively as possible (Andreani et al., 2023; He et al., 2020; Sadig & Wu, 2024; Thavamani et al., 2020). Cultured meat, also referred to as in vitro or lab-grown meat, is produced from animal cells under controlled conditions and offers a meat-like product without the need for animal slaughter (Chemnitz & Becheva, 2022; Post, 2012; Rosenfeld & Tomiyama, 2023; Sghaier & Hocquette, 2020). Edible insects such as crickets and mealworms provide high-quality protein and can be produced in environmentally friendly ways (van Huis et al., 2013; Nowakowski et al., 2021). These alternatives have a significantly lower ecological footprint: plant- and insect-based products generate lower greenhouse gas emissions and require less water and land than conventional meat production (Clune et al., 2017; Poore & Nemecek, 2018).

In a 2020 nationwide survey of 1,800 American consumers, participants were asked to choose between four types of hamburger patties: conventional beef, cultured meat, plant-based pea protein, and a hybrid patty containing both plant and animal ingredients. When offered these options without brand names and at equal prices, 72% of respondents chose the conventional beef patty, 16% chose the plant-based pea patty, 7% chose the hybrid, and only 5% chose the cultured meat option. Adding brand names (e.g., Certified Angus Beef, Beyond Meat, Impossible Foods, Memphis Meats) increased the share of those selecting conventional beef to 80%. Even when the price of the meat alternatives was reduced by 50%, conventional beef maintained its leading position. The study found that vegetarians, men, younger individuals, and those with higher education levels were more open to meat alternatives. Moreover, more participants opposed than supported the use of the term “beef” for plant-based or cultured meat products (Van Loo et al., 2020).

### ***Global and Hungarian acceptance of plant-based meat alternatives***

The development of plant-based meat alternatives has made it easier for flexitarians, vegetarians, and vegans to adopt a meat-free diet. Flexitarians are the primary target group for these products, as they enable reduced meat consumption without requiring full abstinence. Several studies have shown that heavy meat-eaters are less willing to substitute plant-based alternatives compared to flexitarians and may be discouraged by labels such as “plant-based” or “vegan.” However, other studies suggest that as more consumers become familiar with plant-based products, fewer seek alternatives that mimic the sensory characteristics of meat, since vegetarians and vegans typically do not prioritise such properties in their food (Andreani et al., 2023).

A nationally representative survey conducted by Szakály and Szilágyi (2022) with 500 participants revealed that one-third of Hungarian consumers had already tried plant-based meat alternatives. Openness was higher among women, younger respondents, and those with higher education levels. Nearly 70% of respondents indicated that they did not plan to try plant-based products in the future, suggesting that the market for these products in Hungary remains a niche.

### ***Global and Hungarian acceptance of cultured meat***

In the case of cultured meat, initial consumer reactions often include disgust and perceptions of unnaturalness. Although cultured meat most closely resembles traditional meat in appearance and preparation, acceptance must be studied from a psychological perspective. For instance, one study showed that participants were more willing to try cultured meat when it was labelled as “clean meat” rather than “lab-grown meat” (Sghaier & Hocquette, 2020; Rosenfeld & Tomiyama, 2023). It also remains unclear whether individuals following a flexitarian or vegetarian diet would accept this category as a meat substitute.

Researchers at the University of Debrecen conducted a nationally representative survey of 500 Hungarian participants to investigate consumer preferences regarding cultured meat. The results indicated that acceptance of cultured meat is very low: only 4.2% were certain they would try it, and just 5.2% would consume it regularly. However, willingness to try was higher among those who had already consumed plant-based alternatives, as well as among younger, health-conscious, and environmentally aware individuals (Szakály et al., 2024).

In a separate study, Pakurár and Kiss (2023) used an online questionnaire with 132 respondents to examine how AI-generated (artificial intelligence) images influenced consumer attitudes toward unfamiliar foods and specifically cultured meat. Their findings indicated that such images significantly increased both willingness to try and to purchase the product, although they did not enhance willingness to pay a premium.

### ***Global and Hungarian acceptance of edible insects***

Consumer acceptance of insect-based foods in Western countries remains low, and few people are willing to consume insects as a meat substitute. Such foods are often met with fear and aversion. However, prior positive experiences, such as trying insect-based dishes while travelling in Asia, can increase willingness to consume edible insects (Nowakowski et al., 2021; Thavamani et al., 2020). According to a representative survey conducted by Hungary’s National Food Chain Safety Office (NÉBIH), since 2016, the proportion of consumers rejecting insect consumption has increased by 2.4%. Fewer than 5% of Hungarian consumers are willing to eat insect-based foods, while over 70% firmly reject the idea (NAK, 2023). Szendrő et al. (2021) also examined Hungarian consumers’ openness to insect-based foods in a non-representative survey involving 414 participants. They found that while general knowledge of insect consumption was average, willingness to try such foods remained low. Men were more open than women, as were individuals with higher education, and those aged 30–39 showed the greatest openness. No significant preferences were found based on residence or income. The researchers concluded that Hungarian consumers exhibit a strong aversion to insect-based foods, and without commercial availability, a substantial increase in consumption is unlikely.

### ***An environment-conscious consumer segment: LOHAS (Lifestyles of Health and Sustainability)***

In light of the low acceptance of meat alternatives, particularly lab-grown and insect-based proteins, it becomes crucial to explore consumer segments that may be more open to such innovations. One such group comprises individuals whose lifestyle choices are driven by sustainability, health, and ethical considerations. The LOHAS segment includes consumers

who place high importance on environmental responsibility, social equity, personal health, and sustainable consumption (Szakály 2017; Töröcsik, 2007). These individuals are more likely to adopt environmentally friendly behaviours, including reducing meat consumption, and demonstrate greater acceptance of innovative food technologies aimed at mitigating climate and animal welfare issues (Choi and Feinberg, 2018). Within this context, hobby runners present a relevant research target group. Regular participation in sports, such as recreational running, has been associated with greater health consciousness and a proactive approach to diet and lifestyle management (Wirnitzer et al., 2023).

## **Findings**

In my research, the initial hypothesis was that, within the specific, health-conscious target group of recreational runners, a higher proportion would adhere to plant-based diets than in the general population. This assumption appeared to be confirmed over the course of the study: in the sample of 876 participants who were running at least once a week, the proportion of individuals following a vegetarian diet reached 6.4%, whereas in the Hungarian adult population, this figure ranges only between 1.1% and 2.8%, according to existing research. A similar discrepancy was observed regarding the trial of meat substitute products: 46% of recreational runners reported consuming at least two types of plant-based meat alternatives occasionally or more frequently, while nationally representative studies indicate that such trial rates do not exceed one-third of the general population (Kovács, 2021; KSH, 2019; Pintér, 2024; Szakály & Szilágyi, 2022).

## ***Methodology***

The methodology of the study was based on a self-developed online questionnaire, which was distributed using a convenience sampling approach combined with snowball sampling. The dissemination took place through running-related social media groups, running clubs, and posters containing QR codes (Quick Response codes). Data were analysed using SPSS (Statistical Package for the Social Sciences) software, employing descriptive and cross-tabulation statistics, along with significance tests. The three categories of meat alternatives: plant-based substitutes, lab-grown meat, and insect-based foods were examined separately, as they are characterised by distinct consumer perceptions and technological backgrounds. While this classification is not entirely novel in the academic literature, the originality of the present study lies in its focus on a specific, previously unexplored target group: hobby runners. Moreover, the research offers a comprehensive comparison of consumer awareness, acceptance, and willingness to try these alternatives, and examines their relationships with dietary habits and underlying motivations.

The primary aim of this research was to gain insight into individuals who run at least once per week, focusing on their demographic characteristics, running-related motivations, and dietary preferences, particularly regarding special diets and meat-substitute alternatives. The online questionnaire was available on the Google Forms platform between 19 and 29 October 2024. During this period, 895 responses were received. However, 19 respondents were screened out at the filtering questions, as they either did not run at all or reported running less frequently than once a week. Consequently, their input was deemed irrelevant to the study objectives, and the final sample comprised 876 participants.

## ***Sample composition***

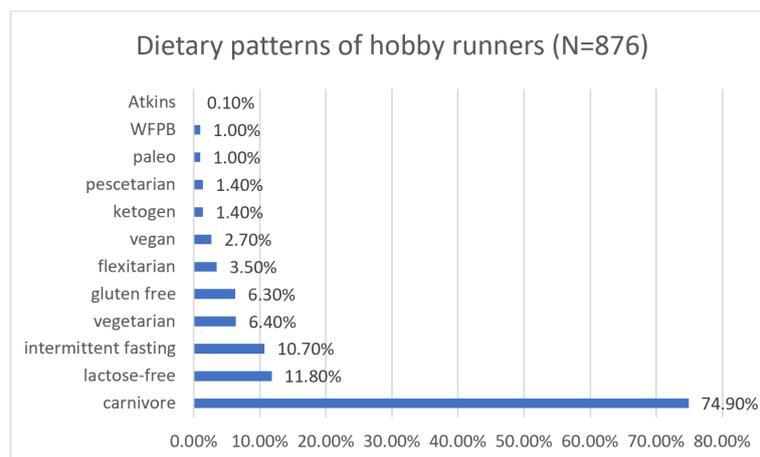
Based on the demographic data of the respondents who reported running at least once per week (N = 876), 69.3% identified as female and 30.7% as male. Within this group, 0.5% were under the age of 18, and 5.5% were between 18 and 27 years old, meaning that 6% belonged to Generation Z. Respondents aged 28–43 (Generation Y) made up 32.7% of the sample, while

the largest generational cohort was Generation X (aged 44–59), accounting for 58.6%. The Boomer generation (aged 60–78) represented 2.6%, and one respondent belonged to the Silent Generation (0.1%). In terms of place of residence, approximately one-third of respondents (34%) lived in the capital city, 49% resided in county capitals or other urban areas, and 17% lived in smaller settlements, such as villages or rural homesteads. Regarding educational attainment, 0.9% had completed only primary education. Half of these respondents were under 18 and likely still attending secondary school. Additionally, 5.1% had vocational qualifications, 26.2% held a secondary school maturity exam, and a remarkably high proportion (67.8%) possessed a higher education degree, indicating that two-thirds had at least a bachelor’s degree. Regarding financial status, 4.2% reported living under financial constraints, 33.6% stated they lived comfortably but were unable to save, while 50.6% said they lived well and could save money. Due to the sensitive nature of this question, an option for “do not know / prefer not to answer” was provided, which was selected by 11.6% of respondents.

## Results

In the context of this study, only one of the five hypotheses formulated could be confirmed based on the empirical results, while four had to be rejected.

*H1. The most common dietary pattern among regular runners is omnivorous, while vegetarianism is the most popular among special diets.*



**Figure 6:** Dietary patterns of hobby runners

**Source:** compiled and edited by the author based on primary data

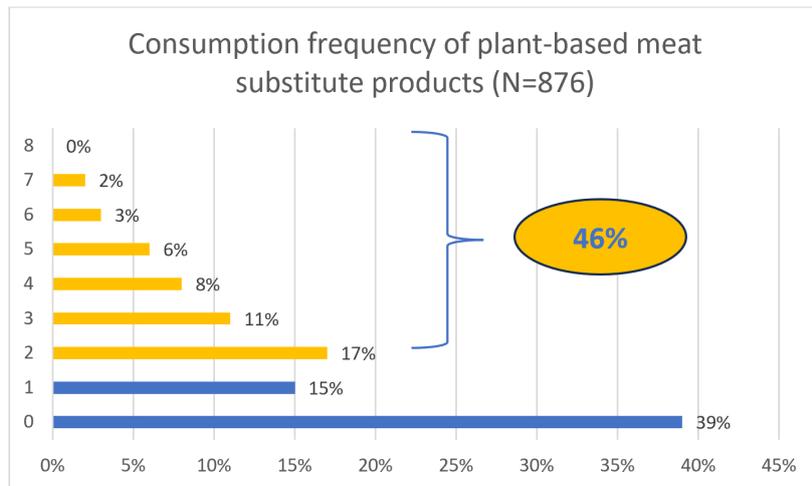
The analysis of questionnaire responses confirmed that omnivorous eating is indeed the most prevalent diet among regular runners, with 74.8% of participants following it. Vegetarianism is practised by 6.4% of respondents. However, this was preceded in popularity by lactose-free diets (11.8%) and intermittent fasting (10.9%). Consequently, this hypothesis must be rejected (Figure 1 shows the breakdown of diets within the sample; axis Y shows the diets followed by respondents, while axis X shows the percentage of respondents following that diet).

When aggregating respondents who identified as vegan, vegetarian, or followers of a whole food plant-based diet, the proportion of individuals adhering to a meat-free dietary pattern amounted to 9.2% of the sample.

*H2. At least half of regular runners consume at least two types of plant-based meat alternatives occasionally or regularly.*

The results revealed that 46% of participants reported consuming at least two types of plant-based meat substitutes occasionally or more often, while 54% either did not consume any or only one type (This is illustrated in Figure 2, where axis Y shows the number of plant-based

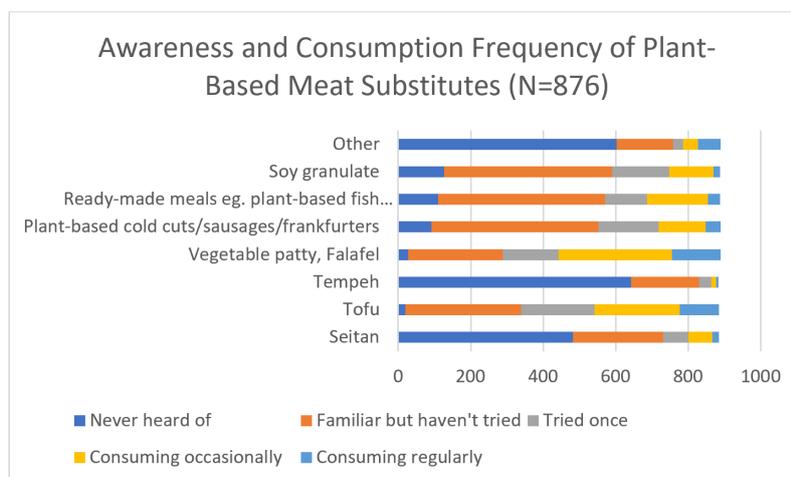
meat alternatives tried while axis X shows the percentage of respondents). Therefore, this hypothesis is also rejected.



**Figure 7:** Consumption frequency of plant-based meat substitute products  
**Source:** compiled and edited by the author based on primary data

Based on secondary research and personal expectations (especially regarding the assumed higher prevalence of vegetarianism among hobby runners), it was anticipated that consumption of plant-based meat alternatives would be higher. The 46% figure is close to the hypothesised threshold of 50%, suggesting that with expanded product availability, future research may find a proportion exceeding this benchmark.

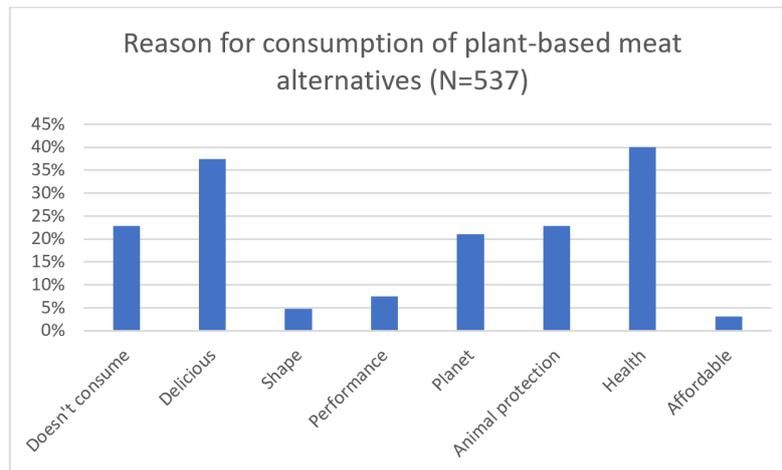
It can be concluded that tofu, vegetable patties, and falafel were the most well-known plant-based meat alternatives, with only a few dozen respondents indicating unfamiliarity with these products. Similar levels of awareness were observed for plant-based cold cuts, sausages, frankfurters, and ready-made meals (such as plant-based fish fingers or burger patties), as well as soy granules. More than half of the respondents had never heard of seitan, while approximately three-quarters were unfamiliar with tempeh. At least occasionally, 50.9% of respondents consume vegetable patties and falafel, 39% consume tofu, 22.9% consume plant-based ready meals (e.g., fish fingers, burger patties), and 19.4% consume plant-based versions of processed meat products such as cold cuts, sausages, or frankfurters. Figure 3 demonstrates the familiarity and consumption frequency of each examined meat substitute.



**Figure 8:** Awareness and consumption frequency of plant-based meat substitutes  
**Source:** compiled and edited by the author based on primary data

*H3. Among those who consume plant-based meat alternatives occasionally or regularly, at least two-thirds believe that doing so benefits their health.*

Among those who reported consuming at least one type of plant-based meat alternative at least occasionally (N = 537), only 40% agreed that this choice was beneficial to their health. As a result, this hypothesis must also be rejected. This finding was somewhat unexpected, as it had been presumed that health considerations would be the primary motivation for consuming plant-based alternatives. While this assumption was confirmed in general, the actual magnitude was lower than anticipated.



**Figure 9:** Reason for consumption of plant-based meat alternatives.  
**Source:** compiled and edited by the author based on primary data

Notably, 37.4% cited taste (“delicious”), 22.9% mentioned animal protection, and 21% identified planetary sustainability as key drivers. These findings suggest that the appeal of meat substitutes among hobby runners extends beyond health concerns, encompassing ethical and environmental values as well as sensory satisfaction. Figure 4 details the possible motivational factors for consuming plant-based meat alternatives and the percentage of respondents who report them.

*H4. Individuals following meat-inclusive diets are more open to trying cultured meat and insect-based foods than those following meat-free diets.*

Among participants following diets that included meat (omnivorous, flexitarian, pescatarian, paleo, ketogenic, Atkins, or other special diets, N = 795), 28.05% were open to trying cultured meat, and 34.97% were open to trying insect-based foods. In comparison, among those adhering to meat-free diets (vegan, vegetarian, whole-food plant-based, N = 81), 13.58% were open to trying cultured meat and 20% to insect-based products.

To test the relationship between diet type and willingness to try alternative protein sources, Pearson’s chi-square test was applied. The results were statistically significant at the 5% level for both cultured meat ( $\chi^2 = 7.862$ ,  $p = 0.005$ ) and insect-based products ( $\chi^2 = 7.300$ ,  $p = 0.007$ ).

The strength of association, measured by Cramér’s V, was 0.095 for cultured meat and 0.091 for insect-based products, indicating a very weak associative relationship. These results suggest that, while diet type is statistically associated with willingness to try alternative proteins, the magnitude of its influence is modest. This hypothesis is accepted.

To explore participants' spontaneous associations with cultured meat, an open-ended question was included in the survey. A total of 719 respondents attempted to answer this question; however, 7 responses consisted solely of punctuation marks and were excluded from analysis, leaving 712 valid entries. The most frequently mentioned associations were “artificial” (193 mentions) and “fake” (162 mentions). These associations are visualised in Figure 5.

Artificial  
 Fake No Unnatural  
 Unhealthy

**Figure 10:** *Associations for cultured meat*

**Source:** *compiled and edited by the author based on primary data.*

At the end of the questionnaire, respondents were also invited to share their free-text opinions on edible insect-based foods (N=698). Prominent terms included “no” (121 mentions), typically in contexts such as “I would not try it,” followed by “disgusting” (104 mentions) and “protein” (70 mentions). These associations are visualised in Figure 6.

No Protein  
 Disgusting  
 Nauseating Ew!

**Figure 11:** *Associations for edible insects*

**Source:** *compiled and edited by the author based on primary data.*

Although negative associations dominated for both alternatives, it is noteworthy that, for insect-based meat, the term was also mentioned in a positive context as a source of protein.

*H5. Cultured meat and insect-based foods are more likely to be tried by men, individuals under the age of 28, residents of the capital, those with higher education, and those with higher material well-being.*

To examine the demographic determinants of willingness to try cultured and insect-based foods, Pearson’s chi-square test, Cramér’s V, and adjusted standardised residuals were used, with a significance threshold set at 5%.

- Gender: Statistically significant relationships were found (cultured meat:  $\chi^2 = 32.517$ ,  $p < 0.001$ ,  $V = 0.193$ ; insect-based:  $\chi^2 = 24.613$ ,  $p < 0.001$ ,  $V = 0.168$ ). Residual values for men exceeded +5 in the “would try” category, while those for women were around +5 in the “would not try” category, indicating strong and directed gender differences.
- Age: No statistically significant association was found (cultured meat:  $\chi^2 = 3.779$ ,  $p = 0.437$ ; insect-based:  $\chi^2 = 1.542$ ,  $p = 0.819$ ). No residual exceeded  $\pm 2$ , and the age group under 18 could not be evaluated due to a low sample size (N = 4).
- Place of residence: Significant relationships were observed (cultured meat:  $\chi^2 = 16.031$ ,  $p < 0.001$ ,  $V = 0.135$ ; insect-based:  $\chi^2 = 10.844$ ,  $p = 0.004$ ,  $V = 0.111$ ). Residents of the capital were significantly more open (residuals: cultured meat +3.7; insect-based +2.9), while rural respondents were significantly more dismissive (cultured meat -2.6; insect-based -2.5).
- Education: Statistically significant differences were also identified (cultured meat:  $\chi^2 = 10.379$ ,  $p = 0.016$ ,  $V = 0.109$ ; insect-based:  $\chi^2 = 15.804$ ,  $p = 0.001$ ,  $V = 0.134$ ).

Those with a university degree had residuals around +3 in the “would try” category, while secondary school graduates showed significant rejection in the “would not try” category (residuals around -2.5).

- Financial status: No significant relationship was found (cultured meat:  $\chi^2 = 4.996$ ,  $p = 0.172$ ,  $V = 0.076$ ; insect-based:  $\chi^2 = 2.785$ ,  $p = 0.426$ ,  $V = 0.056$ ). Although slightly higher willingness was observed among those who reported living well and being able to save, the residuals (+1.4 to +1.9) did not reach statistical significance.

Hypothesis	Cultured meat	Edible insects
Rather men	✓	✓
Rather under 28 years of age	✗	✗
Rather living in the capital	✓	✓
Rather with a higher degree	✓	✓
Rather financially stable	✗	✗

**Table 1:** Hypothesis acceptance by demographics

**Source:** compiled and edited by the author based on primary data.

In summary, as shown in Table 1, male respondents, urban residents, and individuals with higher educational attainment showed significantly greater openness to cultured and insect-based foods. Conversely, women, rural residents, and those with secondary education exhibited higher rejection rates. Thus, the hypothesis is only partially supported, with three variables confirmed (gender, residence, education) and two (age, financial status) not confirmed.

## Conclusions

The findings of this exploratory study indicate that recreational runners exhibit a higher level of openness to meat-free diets and alternative protein sources than the general population in Hungary. In the non-representative sample of 876 respondents, 6.4% reported following a vegetarian diet, which significantly exceeds the Hungarian national average of 1.1–2.8% (Kovács, 2021; KSH, 2019; Szakály & Szilágyi, 2022). Furthermore, 46% of respondents reported consuming at least two types of plant-based meat substitutes at least occasionally, surpassing the approximately one-third adoption rate observed in national representative surveys (Szakály & Szilágyi, 2022).

Health considerations were identified as the primary driver of meat substitute consumption, followed by ethical and environmental concerns. These patterns reflect global trends observed among LOHAS-type consumers who prioritise personal health, ecological sustainability, and animal welfare.

In contrast, acceptance of lab-grown meat and insect-based protein sources remains low, mirroring findings from Hungary and internationally, in which disgust, unnaturalness, and food neophobia were dominant reactions. However, there are nuanced signs of openness in this specific segment, such as the positive framing of insect-based foods as protein-rich alternatives. These insights suggest that hobby runners could be a valuable early-adopting target group for sustainable food innovations. Although the research is not representative, the results suggest that recreational runners are proportionally more open to meat-free diets and alternative protein sources than the general population.

Demographic factors such as gender, education, and place of residence significantly influenced willingness to try lab-grown and insect-based foods, with men, urban residents, and higher-educated respondents showing greater openness. These results align with the observations of Szakály and Szilágyi (2022), who found that women, older individuals, and those with lower educational attainment were generally more resistant to novel food technologies, particularly meat substitutes. Similarly, Szakály et al. (2024) reported that younger, health-conscious, and environmentally aware consumers had a higher propensity to try lab-grown meat, a trend also observed among hobby runners in the present study. Furthermore, Szendrő et al. (2021) highlighted generational and educational differences in the acceptance of insect-based foods, noting that men and individuals with university degrees were generally more open to entomophagy. These earlier findings reinforce the conclusion that demographic segmentation plays a crucial role in shaping consumer responses to alternative proteins and support targeting educated, urban, and health-conscious subgroups as potential early adopters of sustainable food innovations.

### ***Limitations***

The study employed a convenience sampling method using snowball distribution via online running communities and social media, which may limit the generalizability of the findings. The sample is overrepresented by individuals with higher education and urban residency, which may bias the results toward more health-conscious and sustainability-oriented perspectives. Additionally, the self-reported nature of dietary habits and attitudes may be subject to social desirability bias.

### ***Future research directions***

Future studies should aim to employ representative sampling methods to confirm these preliminary findings on a broader scale. It would also be valuable to investigate the psychological drivers (e.g., food neophobia, identity-based motivations) behind the acceptance or rejection of novel protein sources such as lab-grown meat and edible insects. Longitudinal research could further explore how lifestyle choices such as regular physical activity interact with dietary transitions and the adoption of sustainable consumption practices. Finally, segmentation analysis based on values, attitudes, and behavioural intentions could guide more targeted food marketing strategies aimed at health- and sustainability-oriented consumers.

### ***Recommendations***

To effectively promote meat alternatives in the evolving food industry, tailored strategies should be adopted for each category. For plant-based meat substitutes, health-centric messaging remains a key driver, particularly among consumers who are already health-conscious or physically active, such as hobby runners. Emphasising nutritional benefits, such as reduced saturated fat and increased fibre content, can enhance appeal. Furthermore, offering products in familiar formats such as burgers or sausages with optimised taste and texture can help overcome sensory hesitations. Clear, transparent labelling that avoids overly technical or exclusionary language (e.g., solely vegan-focused branding) may also broaden consumer acceptance, particularly among flexitarians.

For lab-grown meat, reframing its identity using more appealing terminology, such as "cultivated" or "clean meat," can reduce perceptions of artificiality and increase openness. Marketing efforts should target early adopters, especially those aligned with LOHAS values, who tend to be more receptive to innovations supporting sustainability and animal welfare. Educational campaigns highlighting the reduced environmental footprint and ethical

advantages compared to traditional meat production may further enhance acceptance, particularly among environmentally and ethically motivated consumers.

In the case of insect-based protein products, indirect integration into familiar foods, such as protein-enriched snacks or pasta, can significantly increase psychological acceptability. Positioning insect protein as a high-performance, nutrient-rich food source is especially promising for athletic and health-oriented demographics. Additionally, storytelling about the traditional and global culinary uses of edible insects can help normalise consumption by presenting these products not as novelties but as rediscovered, sustainable dietary solutions with deep cultural roots. Together, these approaches can support more effective positioning and wider adoption of alternative proteins in the food landscape.

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