SPORT HABITS AND FOOD PURCHASING AND CONSUMING PATTERNS OF VEGETARIANS AND VEGANS IN HUNGARY

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Abstract: *In Hungary, just as in every other country, more and more people choose to live on a meatless diet. With this paper, we try to illustrate and give a better understanding of the sport habits and the purchasing and consumption patterns of vegans and vegetarians. We found a relationship between the degree of education and meatless dieting, as over 50% of vegans and vegetarians included in the research have had a university degree in some field. In this consumer segment, people mainly purchase food at foreign chain stores and quite a significant amount of people buy food at their local markets. The price sensitivity of Hungarians was once again proven in our research. The majority of respondents exercise for 30 to 60 minutes. The most popular form of movement is running. 70% of vegetarians and vegans do not consume high protein dietary supplements. Anyone who does is accustomed to flavored protein powder, protein bars, due to their low protein diet, as well as to maintain and increase their muscle mass.*
Keywords*: vegetarianism, vegan, Hungarian food consumption, purchasing of food, sport nutrition, protein consumption*

1. INTRODUCTION

Nowadays, more and more diets and eating methods are coming to light. Meatless diets are not new, and the number of vegetarians and vegans is growing. We must pay attention to the sport **habits and the purchasing and consumption patterns of** this consumer group so that the food industry would be able to produce innovative products for them and the individual food production plants would be able to remain competitive. Thus, the present research aims to map the consumption and shopping habits of those who eat meat-free meals among Hungarian consumers. Several research publications on food consumption habits have been published previously

(Gál et. al. 2014) (Panyor et. al. 2014), and these have also been used to inform our research.

In our previous research, which appeared in the Hungarian Academy of Sciences' publication of Agricultural and Rural Development Research for the Future (2020), we discovered a correlation between the level of education and vegetarianism, as more than 60% of them have a university degree based on their answers. 75% of them live in cities. And their sports habits did not differ from those of carnivorous individuals.

As the first step regarding domestic statistics, we collected data from the Central Statistical Office to look at domestic food consumption. We found data up to and including 2018.

Table1: Daily protein intake from different foods in grams

Year	Meat	Fish	Milk	Egg	Fat	Flour and rice	Potato	Vegetables, Fruits	Other plant based foods	Total	Out of this: animal protein
2005	33,7	1,7	16,0	5,9	1,9	32,1	4,6	7,0	2,5	105,4	59,2
2006	35,0	1,8	15,6	5,8	1,9	30,3	4,2	7,5	2,5	104,6	60,0
2007	33,4	1,8	15,7	5,7	1,8	29,1	4,1	7,2	2,5	101,3	58,4
2008	32,6	1,8	15,2	5,5	1,7	29,3	4,5	7,5	2,5	100,6	56,7
2009	32,7	1,7	15,0	5,3	1,7	29,1	4,2	7,4	2,4	99,5	56,4
2010	29,9	1,7	15,0	5,1	1,6	29,1	4,2	6,7	2,5	95,8	53,3
2011	29,5	1,7	14,6	4,7	1,6	28,1	4,4	6,7	2,3	93,6	52,1
2012	29,9	1,7	15,0	4,6	1,6	28,2	4,3	6,2	1,9	93,4	52,8
2013	29,4	1,7	14,1	4,6	1,4	28,2	4,0	6,5	2,2	92,1	51,3
2014	31,1	1,9	15,0	4,8	1,5	27,9	4,3	6,9	2,3	95,7	54,3
2015	33,9	2,0	15,9	4,9	1,7	27,7	4,2	7,3	2,5	100,1	58,4
2016	35,2	2,0	16,2	5,0	1,7	29,1	4,1	7,3	2,6	103,2	60,1
2017	37,9	2,1	15,9	5,1	1,7	29,8	3,9	7,3	2,8	106,5	62,7
2018	40,3	2,2	15,9	5,2	1,8	30,2	4,1	7,3	2,9	109,9	65,4

Source: Central Statistical Office

In the first table, you can see the amount of protein per capita in grams from 2005 to 2018. It is clear from the data that protein consumption, especially of animal origin, has been increasing since 2013. The latter is significantly absorbed into our bodies in the form of meat and milk. We take in organic protein in the form of flour and rice, as well as vegetables and fruits. We can say that domestic food consumption is relatively balanced. It is not highly concentrated in the form of either animal or organic protein, although the former is present in higher proportions.

Hungarian cuisine has truly characteristic flavors. In addition to traditional seasoning, foods rich in carbohydrates and fat can also be found in traditional Hungarian cuisine. We should also mention here the importance of *„Hungarikums"* in the food industry, which have historical value, are traditionally produced and, serve as a representative for their additional intrinsic values. (Kis and Pesti, 2015).

From the 1980s to 2010, the health of the Hungarian population has deteriorated. This is due to unbalanced diets, over-consumption of alcohol and other substances, and unhealthy, sedentary lifestyles. In his study, Rigó (2013) points out that improper, unbalanced nutrition plays a significant role in the annual mortality rate of 145,000 people and the reduced life expectancy of the Hungarian population. Besides, there is a correlation between the 80,000 deaths dute to cardiovascular diseases and the 32,000 cancer patient cases per year and unhealthy diet.

Amino acids are the building blocks of proteins. In addition to being utilized by our body as an energy source, it is a precursor to several processes within us, i.e., compounds that are involved in processes that produce other compounds. For example, they play an important role in proper hormone function.

From nutritional point of view, we consider those amino acids that we need to get into our body from an external food source to be essential. The lack of these can cause disturbances in the growth of children, as well as negatively affect the functioning of the adult body. Different foods have different values for our amino acid requirements. This depends on the quality of the protein itself and the amount and quality of other substances that satisfy the body's energy needs. Proteins of animal origin generally contain sufficient amounts and proportions of essential amino acids, while those of plants contain smaller amounts. Table 2 shows some examples of the protein content and biological value of each nutrient. (Csapó et al., 2006)

Table 2: Examples of the protein content and biological value of each nutrient

Name	Protein (%)	Biological value (%)*
Egg	13,0	94
Cow milk	3,5	85
Beef	20,6	74
Fish meat	16,0	76
Soy	41,5	73
Potato	2,5	67
Pea	22,5	64
Flour	14,0	52

Source: Csapó et. al, 2006

* Based on FAO data, in principle for "whole value" protein.

Our body constantly needs protein, as we lose it through urinating, feces and sweat, as well as hair, nail growth and skin wear. This loss of endogenous protein means 0.34 g of protein per kilogram of bodyweight, which can be replaced by 0.75 g/kg of good quality protein in adults. Of course, this demand is higher in children, infants, ie developing organizations, and those who are expecting a child. From the proteins, the amino acids themselves are utilized by our body. If someone consumes a little amount of protein, they may be left behind in growth, may have edema, and if accompanied by a lack of energy, it may also cause anemia (Csapó et. al, 2006).

Non-essential amino acids are higher in plant-derived raw materials than in animal-derived ones. Based on the protein content of chicken eggs, it can be said that plant-based foods contain an average of 62-81% essential amino acids. Nuts and cereals have lower lysine content than animal protein sources. On the other hand, legumes, cereals and nuts have higher alanine content than dairy products. The content is also higher in cereals, legumes, nuts and some oilseeds than in meat. Instead of white cereals, it is worth choosing whole grains, as they have a higher protein content. On average, vegetarians consume 3-6 times more whole grains, legumes and oilseeds than carnivores.

Table 3: Comparison of the relative biological value of proteins

Source of protein	Relative biological value (%)
Lactalbumin	104
Egg	100
Milk protein	91
Beef	80
Casein	77
Pork	74
Potato	71
Rice	59
Wheat	54
Bean	49
70% lactalbumin + 30% potato	134
75% milk protein + 25% wheat	125
76% egg + 24% milk protein	119
51% milk protein + 49% potato	114

Source: Gubicskóné et. al, 2005

Utilization of by-products and waste from food production itself could also be started to a greater extent, as more unused sources of protein are wasted. These include whey and blood and feathers in slaughterhouses. There are significant breakthroughs in the production of unicellular proteins, namely when microorganisms produce different proteins. Among others,

Candida strains can produce significant amounts of protein in continuous fermentors grown on a paraffin base. (Csapó et al., 2006)

According to the current state of the art, essential amino acids can be produced by chemical processes or by fermentation. L-lysine, L-threonine, L-tryptophan, L-isoleucine can be formed during fermentation and DL-methionine during chemical processes. By combining the artificial essential amino acids produced this way with plant proteins, their biological value can be increased. (Csapó et al., 2006)

According to the current state of science, humans are omnivores, as we can utilize food of both plant and animal origin. Vegetarianism has several trends.

To learn about the history of vegetarianism, we need to know that not one indigenous community has been found where this diet has been fully followed by all members. Vegetarianism first appeared in India and the ancient Greek world through religious-philosophical endeavors. (Balogh, 2017)

The emergence of contemporary "scientific" vegetarianism can be traced back to the 19th century and became popular in Anglo-Saxon areas. At that time, this diet was advertised mainly for health reasons. The preventability of diseases, including gout, has been attributed to the diet. Crossing this "dietary vegetarianism", a holistic worldview has already emerged to this day. Today's vegetarians think in an ethical-moral, environmental, agrotechnological, closed philosophical system of views. Socio-economic reasons have also emerged among those choosing these diets. From a health and dietary point of view, several trends in vegetarianism have emerged. (Balogh, 2017)

Semivegetarianism is a fashion trend today based on a mixed diet. The individual consumes mainly food of plant origin, supplementing it with fish and poultry. In ovo-lacto vegetarianism, the consumption of eggs and milk, and dairy products is allowed. In ovo vegetarianism, only eggs are allowed in addition to plant-based foods. In lacto vegetarianism, milk and dairy products are allowed. In Pesco-vegetarianism, fish can be eaten in addition to plant foods. Vegans, the representatives of veganism, omit all type of food of animal origin from their diet. Raw vegetarians consume 75-100% of vegetarian food raw. Sándor Balogh writes about these in his book "Alternative nutrition - our optional foods" (2017).

Sándor Balogh (2017) also writes that based on the results of various researches, vegetarianism also has health benefits. Among other things, it reduces the risk of developing gallstones and kidney stones, leads to healthy bones, because this diet allows more calcium to be absorbed, and also

provides a healthier source of protein. It also reduces the development of heart disease and stroke, as well as lowers high blood pressure.

In his book, Sándor Balogh (2017) also mentions an expert's opinion from the United States. The essence of their research was to compare the diets of non-vegetarians and vegetarians. The study found that non-meat consumers had a lower incidence of obesity, a lower risk of cardiovascular diseases, and a reduction in deaths. The expert's also showed that vegetarians consume less fat and thus bring fewer calories into their body. They take in more fiber, potassium, and vitamin C than those who consume meat. It is also mentioned that vegetarians generally have a lower body mass index. For these reasons, as well as the factors associated with this lifestyle, we can talk about favorable health changes.

They need a well-composed diet, as this diet can be deficient in many minerals and vitamins. It is especially important to create a well-balanced diet for young children, as inadequate nutrient intake can cause the development of the nervous system and the body to be delayed. (Balogh, 2017)

According to health experts, people can not take in sufficient amount of vitamin B12, which is vital for humans, when only consuming foods from plant origin. Thus, there may be a need for food supplements, fortified foods, which can be produced by bacterial fermentation, so it is not necessary to consume a product of animal origin. They occur mainly in algae, products of animal origin, and foods produced by bacterial fermentation. (Balogh, 2017)

Vegetarians may have an iron deficiency of 40-58% because plant parts contain less iron and are less well absorbed than the food of animal origin. Among the vegetables and fruits, blackcurrant can be highlighted, which even helps its absorption. (Balogh, 2017)

Calcium intake should also be considered by non-meat consumers, as one study found that the incidence of bone fractures was higher among those who ingest less than 525 mg of it. Vegans can cover this with plant-based milk as well as consuming vegetables high in calcium. (Balogh, 2017)

Both the lack and the excessive consumption of iodine also result in inadequate thyroid function. This is also the case for vegans, who have been shown to have abnormal thyroid function if they do not replenish enough iodine in their bodies. (Balogh, 2017)

Lack of important fatty acids can also occur during a meatless meal. Eicosapentaenoic acid and docosahexaenoic acid are long-chain fatty acids that are polyunsaturated. Typically, milk and eggs also contain little of them. It has not yet been demonstrated whether alpha-linolenic acid in plants can compensate for their low levels. (Balogh, 2017)

Perhaps one of the most important things is to incorporate the 8 essential amino acids into the diet of vegetarians as our body is unable to produce them. Few plants have all 8 amino acids involved, so ingredients need to be properly combined among vegans. Milk, dairy products and eggs can be considered a complete source of protein. According to a 1994 study, beans and brown rice, which can be combined and distributed into multiple meals, can provide our adequate protein needs, even among athletes and bodybuilders. (Balogh, 2017)

2. MATERIAL AND METHOD

In the present research, we examine the sport habits and purchasing and consuming patterns of vegans and vegetarians in Hungary. Following the presentation of the important role of proteins and amino acids and vegetarianism, we also conducted our research.

The practical part of the research was conducted with an online questionnaire. The questionnaires were distributed on the social media interface in different vegetarian and vegan groups as they were the target group for us in the present research.

The introductory questions were demographic in theme to try to categorize the study participants based on this factor as well. Thus, the first questions focused on the place of residence, age, gender, education, which showed us what clusters the respondents came from based on the pre-defined answer options.

After that, we turned to the sport habits and purchasing and consuming patterns of vegans and vegetarians in our research. Among other things, we asked the participants what foods they consume, where they procure them, what aspects they take into account when buying, whether they consume extra protein in addition to them, for what reason, and how can they define their excersise in character.

3. RESULTS

Our questionnaire was completed by a total of 284 people, where the respondents were specifically from a vegetarian or vegan diet. In terms of their place of residence, it is worth noting that approx. a quarter of the respondents are residents of Budapest, which is not surprising in terms of population density, but there were many respondents from all over the country. Approximately 86% of the respondents are urban residents, but the

proportion of villagers is also significant (14.1%). This is interesting because, contrary to popular belief, it has now been proven that, yes, meat-free meals are also present in the villages.

63.5% of the respondents came from the 22-45 age group, almost 12% were 46-55-year-olds, but more than 5% were also the 56-64 age group. In terms of gender, 91.7% of those surveyed are women. In terms of educational attainment, in line with our previous research, we can say again that those with a plant diet can be classified as more educated. Namely, more than half of the respondents, exactly 50.5% of them have at least a university degree, and the proportion of high school graduates is almost 25%. It should be mentioned that 15.9% have a vocational secondary school, 7.2% a primary school graduate, 3.3% a vocational school graduate, so we can also clearly see that there are people at all levels of education of vegetarians and vegans.

We also asked about the reason for leaving meat consumption. More than a quarter of survey participants do not consume meat to protect animals. 19.01% avoid consuming meat products to protect their health, 17.6% for ethical reasons, and another nearly 16% to protect the environment. Also, there was considerable abandonment of meat due to some disease, religion, but there are those who simply do not like, do not want to eat meat and feel themselves better without them.

In terms of the place to buy food, it is run by chains established abroad. More than 81% of respondents are in Lidl, 66.2% in Aldi, 61.3% in Spar, more than 54% in Tesco, and almost 50% buy the food and the ingredients at their local market. It is worth mentioning that 14.4% of the respondents also shop in non-packaging stores.

In the present research, the price sensitivity of Hungarian consumers has also been proven, as more than 85% of the respondents also take the price into account when buying products. Around 46% of the respondents find the place of origin and presentation important. Brand loyalty is important to nearly 37% of them and the shelf life is important to 35.5% of people.

Almost 98% of the respondents buy vegetables and fruits selected by them. More than 68% consume herbal beverages, more than 63% organic spreads, and more than 54% canned food. 38.7% of them consume milk and dairy products, and the respondents consume quick-frozen and approximately one-third consume breaded products.

We also asked a question about how important it is to buy a Hungarian product, for which the respondents could give points from 1 to 5. 37.5% gave 4 points, this was followed by the 32% who gave 3 points and 17.3% gave 5. So even if this is not the most determining aspect during the purchase,

consumers are still interested in supporting the place of origin and domestic businesses.

37% of respondents exercise 2-3 times a week, 19.4% exercise 4-5 times a week, 15.1% exercise once a week, and 17.6% do not exercise. Nearly 47% of respondents exercise for 0.5-1 hours, nearly 26% for 1-2 hours, 5.3% for less than 30 minutes during a workout. In terms of movement, our respondents run in the vast majority, which is 36%. 26.5% do gym training and almost 13% dance, the rest do not exercise.

We were also curious if there was any health reason for a vegetarian or vegan diet. Nearly 69% of respondents have no known disease. 13.9% reported lactose intolerance, 11.8% have milk protein sensitivity, 6.8% gluten sensitive, 5.4% are allergic to egg. It is worth mentioning the meat allergy, which affects nearly 2%. We also asked whether participants in the survey followed any weight loss diet. Nearly 69% do not follow any diet. Outstandingly, nearly 15% of them do intermediate fasting.

We also asked questions about protein intake. At first, we wondered if our respondents consumed other forms of protein in addition to food. Nearly 70% do not consume other protein supplements. However, in line with our previous research, the most consumed protein product with nearly 20% of the votes was flavored protein powder and more than 9% was protein bars, which is probably due to their enjoyment factor, as only 4.2% of fillers consumed natural protein powder. 94% of consumers of these products consume them once a day. Within this, 99 respondents consume dietary supplements of plant origin and 27 animal-derived protein supplements. The main reason for consuming these supplements was of a low amount protein in their diet, and then the second reason was maintaining and gaining muscle mass.

We also had a question about what meat substitutes our respondents consumed. Here, mainly tofu, soy, seitan, legumes appeared among the answers, but there were also a significant amount of different products that are reminiscent of meat products.

56% of respondents consume eggs, 50% dairy products, nearly 31% milk, and 12.1% gelatin-containing foods. 31.2% stated that they do not consume food of animal origin at all. Out of all the respondents, approx. one-third, more exactly, 33.6% consider themselves as vegans. Nearly 36% of those who completed the questionnaire have been on their current, meat-free diet for more than 3 years. 16.7% have been eating like this for 1-2 years, 16% for 2-3 years, and 11.6% for just 6-12 months. Another 20% started eating like this less than 1 year ago. It is clear from the numbers that there are constantly new people following a vegetarian or vegan diet in Hungary. And

more than 87% of respondents said they always stick to this diet, and not just intermittently.

4. SUMMARY

A total of 284 people participated in our research. It can be stated that there is a correlation between the level of education and vegetarianism and veganism. 50.5% of vegetarian respondents have a university degree and 25% have a high school degree. We can find vegetarians and vegans of all ages, the vast majority of whom are aged 22-45, and their numbers are constantly growing, with 20% of respondents being vegan or vegetarian for less than 1 year, but in the highest proportion; 36% of respondents have been eating like this for more than 3 years. The leading reason for leaving meat is animal welfare also that it is considered healthier or for ethical reasons. 56% of respondents consume eggs, 50% dairy products, nearly 31% milk. 31.2% stated that they do not consume food of animal origin at all.

Regarding sports, 37% of respondents exercise 2-3 times a week, 19.4% exercise 4-5 times a week, 15.1% exercise once a week, and 17.6% do not exercise. Nearly 47% of respondents exercise for 0.5-1 hours, nearly 26% for 1-2 hours, 5.3% for less than 30 minutes during a workout. The most popular form of movement, according to the questionnaire, is running, followed by gym training and then dancing. Only 30% of respondents consume separate high protein supplements. These are mainly flavored protein powders, protein bars, which are consumed due to their enjoyment factor. The main reason for consuming these was of low protein diet, and to maintain or increase muscle mass. Vegetarians and vegans consume mainly tofu, soy, seitan, legumes for meat replacement purposes.

In the present research, the price sensitivity of Hungarian consumers has also been proven, as more than 85% of the respondents also take the price into account when buying products. Around 46% of the respondents find the place of origin and presentation important. Survey participants buy food mainly in chains established abroad, but there is also a significant number of people who go to their local markets to buy their food.

As the literature also says; vegetarians need a well-formulated diet, as this diet can be deficient in many minerals and vitamins. Taking essential amino acids into the body is also really important and requires a great deal of caution. It is especially important to create a well-balanced diet for young children, as inadequate nutrient intake can cause the development of the nervous system and the body to be delayed. Therefore, with enough care and

attention, we are able to provide our bodies with the proper nutrients through vegetarian and vegan diets.

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