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Proposal of an alternative diet as an element of improving the safety and quality of nutrition for soldiers

Propozycja diety alternatywnej jako element poprawy bezpieczeństwa i jakości żywienia żołnierzy

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Abstract. In a specific community, which is also formed by soldiers, the diet used should satisfy all nutritional needs, using physically and economically available foodstuffs (products, dishes). It can be called a basic diet. However, in certain situations, which include the spread of modern-age diseases, as well as possible difficulties in obtaining previously available food products due to the crisis caused by the ongoing war behind the Poland's eastern border, the use in a prudent manner of alternative diets should be considered. The article presents a proposal for an exemplary pescatarian diet, which can be classified as an alternative diet. The purpose of this publication is to develop menus for a diet that can provide an alternative food standard for soldiers in the context of improving the assurance of the quality of their nutrition. The research problem included in the paper is the following question: how can alternative diets

improve the soldiers' nutrition quality assurance? The publication uses the necessary research theoretical methods: analysis, synthesis and inference, and empirical methods: document examination and computer modeling to develop menus for an alternative diet. The considerations carried out in the publication and the proposal of a menu for an alternative diet – pescatarian – prove its positive influence on preventing the spread of diet-related modern-age diseases, which translates into the health of military personnel, and consequently allows to maintain the required physical fitness of soldiers and their availability during military service and performance of assigned tasks.

Keywords: alternative diet, soldier nutrition, pescatarian diet, menus, food safety

Abstrakt. W określonej społeczności, którą tworzą również żołnierze, stosowana przez nich dieta powinna zaspakajać wszystkie potrzeby pokarmowe, z wykorzystaniem fizycznie i ekonomicznie dostępnych środków spożywczych (produktów, potraw). Można nazwać ją dietą zwyczajową. Natomiast w określonych sytuacjach, do których zaliczyć można ekspansję chorób cywilizacyjnych XXI wieku, a także możliwe trudności z pozyskaniem dotychczas dostępnych niektórych produktów spożywczych, spowodowanych kryzysem w związku z trwającą wojną za wschodnią granicą Polski, należy rozważyć stosowanie w sposób rozważny diet alternatywnych. W artykule przedstawiono propozycję przykładowej diety pescowegetariańskiej, którą można zaliczyć do diet alternatywnych. Celem publikacji jest opracowanie jadłospisu dla diety, która może stanowić alternatywę normy żywienia żołnierzy w kontekście poprawy bezpieczeństwa jakości ich żywienia. Problemem badawczym zawartym w pracy jest pytanie: w jaki sposób dieta alternatywna może poprawić bezpieczeństwo jakości żywienia żołnierzy? W publikacji zastosowano niezbędne badawcze metody teoretyczne: analizę, syntezę i wnioskowanie oraz empiryczne: badania dokumentów oraz modelowanie komputerowe w celu opracowania jadłospisu dla diety alternatywnej. Przeprowadzone w publikacji rozważania i propozycja jadłospisu diety alternatywnej – pescowegetariańskiej dowodzą pozytywnego jej wpływu na zapobieganie rozprzestrzenianiu się chorób cywilizacyjnych o podłożu dietetycznym, co przekłada się na stan zdrowia personelu wojskowego, a w konsekwencji pozwala utrzymać wymaganą sprawność fizyczną żołnierzy oraz ich dyspozycyjność podczas pełnienia służby wojskowej i wykonywania powierzonych zadań służbowych.

Słowa kluczowe: jadłospis, żywienie żołnierzy, dieta alternatywna, pescowegetarianizm, bezpieczeństwo żywienia

Introduction

In the 21st century, due to the enormous progress of science and technology, we observe a dynamic development of civilization. People's living conditions have improved considerably, however, many hitherto unknown threats referred to as modern-age diseases have emerged [8]. They constitute a set of common health disorders, the development and global spread of which is caused by the progress of modern civilization [10]. Indirect causes of this group of diseases include, among others, the continuous economic development of countries, the expansion of urban areas, contamination of natural environment and climate change. However, the decisive factor in the development of modern-age diseases is the lifestyle of modern man, which is characterized by increased stress, lack of sufficient sleep and physical activity, and above all consumption of meals based on fatty and highly processed products. Such a mode of human functioning, combined with an inadequate diet, adversely affects the health of the body and, consequently, contributes to the development of diet-related modern-age diseases, which include, among others, obesity, cardiovascular diseases (atherosclerosis, hypertension), type II diabetes and cancer [17].

Currently, it is very important to prevent the spread of modern-age diseases not so much through innovative treatment methods, but primarily through preventive actions aimed at promoting a healthy lifestyle that includes a well-balanced diet, regular physical activity, and sleep hygiene. Increasing nutritional awareness among the public by disseminating a variety of optimal diets to ensure proper nutritional status while tailoring meals to consumer preferences is also an important aspect of prevention [4]. Alternative diets play an important role in this regard, as a consciously adopted way of eating that aims to give up certain foods or methods of preparing them. One such diet may be pescetarianism which is a variation of semi-vegetarianism.

The purpose of this publication is to develop menus for a diet that can provide an alternative food standard for soldiers in the context of improving the assurance of the quality of their nutrition. The research problem included in the paper is the following question: how can alternative diets improve the soldiers' nutrition quality assurance?

The publication uses the necessary research methods, which include:

- theoretical: analysis, synthesis, and inference;
- empirical: document examination and computer modeling to develop menus for an alternative diet.

Literature review

The topic of alternative diets as a dietary option is one that occurs regularly in the scientific literature as new options emerge and changes in countries' food security are made. Authors of publications usually focus on the characterization and evaluation of selected alternative diets, as exemplified by J. Reguła [12], or D. Tilman & M. Clark [15]. Others, such as W. Craig [5] and Szafarska M., Siwińska-Gołębiowska H. et al, [14] analyze the influence of vegetarian diets, which constitute the core of alternative diets, on the state of health of the human body. The seriousness of the issue is also evidenced by the fact that in 2019, the Committee on Human Nutrition Sciences of the Polish Academy of Sciences has issued an opinion on the nutritional value and safety of vegetarian diets [9]. Studies on the diets and nutrition of the military community, on the other hand, are overwhelmingly based on the assumption that their meals are prepared according to basic/natural diets. However, it should be noted that the commonly used models of nutrition in the Polish Armed Forces are based on each group of food products. Global problems of recent years, such as the COVID-19 pandemic, have proved that the food crisis and limitations of food availability are a real threat, as demonstrated by C. Béné et al. [2]. Another example is the ongoing conflict between Russia and Ukraine, which, according to M. Behnassi and M. El Haib [1], caused a huge and worsening challenge to world

food security due to complications in export, mainly cereal products. In the light of the above, there is a need to consider introduction of alternative diets for soldiers, the judicious use of which will improve the quality assurance of their food and in emergency situations it will allow to eliminate certain groups of food products. Unfortunately, the available scientific literature covering these issues is very poor, hence the need to make an attempt to supplement it.

Characteristics of pescetarianism

Pescetarianism is based on the absolute cessation of the consumption of red meat, i.e. mutton, pork, veal, goat meat, wild game, as well as white meat – poultry. However, eating fish and seafood, eggs, milk and dairy products is acceptable in this dietary model. The biggest advantage of pescetarianism is that this diet includes fish – especially marine fish, which are rich in omega-3 fatty acids (EPA and DHA) that are valuable to the human body. The benefits of this diet also include a higher intake of dietary fiber, vitamin C, and potassium. These aspects translate into a lower risk of cancer, obesity and type II diabetes. In addition, thanks to the exclusion of meat, pescetarianism significantly reduces cholesterol levels, which in turn reduces the risk of cardiovascular diseases. Despite the elimination of certain food groups, the pescetarian diet is considered balanced. It is not lacking in essential nutrients, including vitamins and minerals. It is very beneficial for the skin (due to the large amount of vitamin E in seafood, among others), it supports the immune system, helps maintain correct cholesterol levels, speeds up detoxification of the body, and helps reduce body weight [7].

Proposal of a daily pescetarian diet menu for soldiers

Taking into account the development of diet-related modern-age diseases, as well as the advantages of the pescetarian diet presented above, it is reasonable to develop a proposal for a daily menu according to the food standard in accordance with the accepted requirements [13].

Assumptions of a daily menu for the pescetarian diet:

1. Energy value: 4500 kcal
2. Energy distribution over meals:
 - breakfast (including second breakfast) – about 35%,
 - lunch – about 40%,
 - dinner – about 25%.
3. Nutrient distribution:
 - protein – about 15-20%,

- carbohydrates – 55-60%,
- fats – 25-30%.

A menu for DD/MM/YYYY is shown in Table 1.

Table 1. A daily menu for the pescatarian diet

No.	Meal	Dish	Portion [g·dm ³]	Allergens
1.	Breakfast	Batter noodles with milk	500	1,7
2.	-II-	Salad with egg, chives and radish	160	3, 7
3.	-II-	Wheat rolls	100	1
4.	-II-	Black tea	250	-
5.	-II-	Semi-fat cottage cheese	100	7
6.	-II-	Canned cucumber	100	-
7.	-II-	Wholemeal bread	60	1
8.	-II-	Butter	15	7
9.	Lunch – 1	Apple soup with noodles	500	1, 7
10.	-II-	Fresh plum soup with noodles	500	1, 7
11.	-II-	Wholemeal bread	60	1
12.	Lunch – 2	Fish fillets with stewed vegetables	200	1, 4
13.	-II-	Fish meatballs	120	1, 3, 4, 7
14.	-II-	New potatoes with dill	300	-
15.	-II-	Frozen broccoli cooked in water	150	-
16.	-II-	May salad	100	7
17.	-II-	Farina with jam	250	1, 7
18.	-II-	Dried fruit compote	250	-
19.	Dinner	Dumplings with cheese and fruit	300	1, 3, 7
20.	-II-	Wheat bread	150	1
21.	-II-	Fromage type cheese	50	7
22.	-II-	Red bell pepper	50	-
23.	-II-	Kiwi	120	-
24.	-II-	Tea	250	-

Description of allergens: 1 – cereals containing gluten, 2 – crustaceans, 3 – eggs, 4 – fish, 5 – peanuts, 6 – soybeans, 7 – milk, 8 – nuts, 9 – celery, 10 – mustard, 11 – sesame seeds, 12 – sulfur dioxide and sulfite, 13 – lupine, 14 – mollusks

Source: Own elaboration based on [16]; [3] [Accessed on May 25, 2022]; [3]; [11]

Tables 2-23 include the composition of the dishes, along with the macronutrients for each ingredient of the dish and for the whole dish. Calculations were performed using an Excel spreadsheet based on: *Zbiór receptur potraw stosowanych w wojskowych*

zakładach żywienia zbiorowego, Pracownia żywienia i żywności, Warszawa 2007 as amended [[16]] and *Ilewazy.pl*, Edipresse Polska S.A., <http://www.ilewazy.pl/> [3].

I. Breakfast

Table 2. Batter noodles with milk – ingredients

Product name	Ingredient weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Wheat flour type 500	30	102.9	22.2	3.33	0.36
Eggs	25	35.75	0.18	3.14	2.38
Drinking milk 2.0% fat	400	200	19.2	13.2	7.92
Granulated sugar	0.5	1.94	0.5	0	0
TOTAL	455.5	340.59	42.08	19.67	10.66

Source: Own elaboration based on [3]

Table 3. Salad with egg, chives and radish – ingredients

Product name	Ingredient weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Eggs	100	143	0.72	12.56	9.51
Mayonnaise	30	206.4	0.09	0	23.34
Chives	20	6	0.87	0.65	0.15
Radish	40	6.4	1.36	0.27	0.04
TOTAL	190	361.8	3.04	13.48	33.04

Source: Own elaboration based on [3]

Table 4. Wheat rolls – ingredients

Product name	Ingredient weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Wheat rolls	100	296	59.4	7.5	3.6

Source: Own elaboration based on [3]

Table 5. Semi-fat cottage cheese – ingredients

Product name	Ingredient weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Semi-fat cottage cheese	100	133	3.7	18.7	4.7

Source: Own elaboration based on [3]

Table 6. Canned cucumber – ingredients

Product name	Ingredient weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Canned cucumber	100	11	1.9	1	0.1

Source: Own elaboration based on [3]

Table 7. Butter – ingredients

Product name	Ingredient weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Butter	15	107.55	0.01	0.13	12.17

Source: Own elaboration based on [3]

Table 8. Wholemeal bread – ingredients

Product name	Ingredient weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Wholemeal bread	60	151.2	25.63	7.47	2.1

Source: Own elaboration based on [3]

Using the data collected and the calculations in the tables, the amount of energy from breakfast [kcal] and the number of carbohydrates, proteins, and fats provided in the breakfast meal [g] were calculated. The results are as follows:

$$\text{Energy} = 1401.1 \text{ kcal}, \quad (1)$$

$$\text{Carbohydrates (C)} = 135.76 \text{ g}, \quad (2)$$

$$\text{Proteins (P)} = 68.95 \text{ g}, \quad (3)$$

$$\text{Fats (F)} = 66.37 \text{ g}. \quad (4)$$

II. Lunch

Table 9. Apple soup with noodles – ingredients

Product name	Ingredient weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Apples	150	78	20.72	0.39	0.26
Granulated sugar	20	77.4	20	0	0
Potato flour	2.5	8.93	2.08	0.17	0.01
Cream 18% fat	25	46	0.9	0.63	4.5
Pasta	40	148.4	29.87	5.22	0.6
TOTAL	237.5	358.73	73.57	6.41	5.37

Source: Own elaboration based on [3]

Table 10. Fresh plum soup with noodles – ingredients

Product name	Ingredient weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Fresh plums	150	69	17.13	1.05	0.42
Granulated sugar	20	77.4	20	0	0
Potato flour	2.5	8.93	2.08	0.17	0.01
Cream 18% fat	25	46	0.9	0.63	4.5
Pasta	40	148.4	29.87	5.22	0.6
TOTAL	237.5	349.73	69.98	7.07	5.53

Source: Own elaboration based on [3]

Table 11. Wholemeal bread – ingredients

Product name	Weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Wholemeal bread	60	151.2	25.63	7.47	2.1

Source: Own elaboration based on [3]

Table 12. Fish fillets with stewed vegetables – ingredients

Product name	Weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Fresh fish – fillets	170	156.4	0	33.05	1.67
Peeled carrots, ready to eat	35	14.35	3.35	0.33	0.08
Peeled parsley root, ready to eat	14	7.71	1.72	0.32	0.08
Peeled celery root, ready to eat	19	3.04	0.56	0.13	0.03
Peeled leek, ready to eat	6	2.1	0.47	0.12	0.01
Peeled onion, ready to eat	18	7.21	1.68	0.2	0.02
Wheat flour type 500	5	17.15	3.7	0.56	0.06
Tomato paste	15	12.3	2.84	0.65	0.07
Rapeseed oil	8	70.72	0	0	8
TOTAL	290	290.98	14.32	35.36	10.02

Source: Own elaboration based on [3]

Table 13. Fish meatballs – ingredients

Product name	Weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Fresh fish – fillets	110	101.2	0	21.38	1.08
Wheat roll (stale)	10	27.2	5.85	0.73	0.15
Drinking milk 2.0% fat	20	10	0.96	0.66	0.4
Eggs	10	14.3	0.07	1.26	0.95
Peeled onion, ready to eat	7	2.8	0.65	0.08	0.01
Wheat flour type 500	2	6.86	1.48	0.22	0.02
Rapeseed oil	5	44.2	0	0	5
TOTAL	164	206.56	9.01	24.33	7.61

Source: Own elaboration based on [3]

Table 14. New potatoes with dill – ingredients

Product name	Weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
New edible potatoes	370	284.9	64.71	7.59	0.33
Margarine “Masło roślinne MR”	10	71.7	0.01	0.09	8.11
Green dill	2	0.86	0.14	0.07	0.02
TOTAL	382	357.46	64.86	7.75	8.46

Source: Own elaboration based on [3]

Table 15. Frozen broccoli cooked in water – ingredients

Product name	Weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Frozen broccoli	170	44.2	8.13	4.78	0.49
Breadcrumbs	2	7.9	1.44	0.27	0.11
Margarine “Masło roślinne MR”	10	71.7	0.01	0.09	8.11
TOTAL	182	123.8	9.58	5.14	8.71

Source: Own elaboration based on [3]

Table 16. May salad – ingredients

Product name	Weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Lettuce	35	4.9	1.04	0.32	0.05
Radish	50	8	1.7	0.34	0.05
Chives	20	6	0.87	0.65	0.15
Cream 18% fat	25	46	0.9	0.63	4.5
Granulated sugar	1	3.87	1	0	0
TOTAL	131	68.77	5.51	1.94	4.75

Source: Own elaboration based on [3]

Table 17. Farina with jam – ingredients

Product name	Weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Farina	45	156.6	34.52	3.91	0.59
Drinking milk 2.0% fat	180	90	8.64	5.94	3.56
Granulated sugar	8	30.96	8	0	0
Fruit jam	25	69.5	17.22	0.09	0.02
TOTAL	258	347.06	68.38	9.94	4.17

Source: Own elaboration based on [3]

Table 18. Dried fruit compote – ingredients

Product name	Weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Dried fruit	25	62.25	15.97	0.83	0.23
Granulated sugar	25	96.75	25	0	0
TOTAL	50	159	40.97	0.83	0.23

Source: Own elaboration based on [3]

Using the data collected and the calculations in the tables, the amount of energy from lunch [kcal] and the number of carbohydrates, proteins, and fats provided in the lunch meal [g] were calculated. For calculations, the arithmetic mean of the values from the two soup choices and the arithmetic mean of the values from the two second courses (fried eggs and egg cutlet) were used. The results are as follows:

$$\text{Energy} = 1810.27 \text{ kcal} \approx 1810 \text{ kcal}, \quad (5)$$

$$\text{Carbohydrates (C)} = 298.38 \text{ g}, \quad (6)$$

Proteins (P) = 69.66 g, (7)

Fats (F) = 42.69 g. (8)

III. Dinner

Table 19. Dumplings with cheese and fruit – ingredients

Product name	Weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Dumplings with cheese and fruit	260	500.39	93.58	22.91	5.44
Cream 18% fat	25	46	0.9	9.63	0.5
Granulated sugar	15	58.05	15	0	0
TOTAL	300	604.44	109.48	32.54	5.94

Source: Own elaboration based on [3]

Table 20. Wheat bread – ingredients

Product name	Weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Wheat bread	150	399	74.13	13.28	5

Source: Own elaboration based on [3]

Table 21. Fromage type cheese – ingredients

Product name	Weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Fromage type cheese	50	147.5	1.75	3.55	14.3

Source: Own elaboration based on [3]

Table 22. Red bell pepper – ingredients

Product name	Weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Red bell pepper	50	12.4	2.41	0.4	0.12

Source: Own elaboration based on [3]

Table 23. Kiwi – ingredients

Product name	Weight [g]	Energy [kcal]	C [g]	P [g]	F [g]
Kiwi	80	48.8	11.73	0.91	0.42

Source: Own elaboration based on [3]

Using the data collected and the calculations in the tables, the amount of energy from dinner [kcal] and the number of carbohydrates, proteins, and fats provided in the dinner meal [g] were calculated. The results are as follows:

$$\text{Energy} = 1212.14 \text{ kcal} \approx 1212 \text{ kcal}, \quad (9)$$

$$\text{Carbohydrates (C)} = 199.5 \text{ g}, \quad (10)$$

$$\text{Proteins (P)} = 50.68 \text{ g}, \quad (11)$$

$$\text{Fats (F)} = 23.78 \text{ g}. \quad (12)$$

Having calculated the macronutrients in each meal and the amount of energy provided, the total number of calories made up of the three meals, the daily macronutrient distribution, and the percentage distribution of each meal can be calculated.

$$\text{Energy}_{\text{total}} = 4423 \text{ kcal} \quad (13)$$

$$\text{Carbohydrates (C)} = 663 \text{ g} = 2652 \text{ kcal} = 55.93 \% \quad (14)$$

$$\text{Proteins (P)} = 189 \text{ g} = 756 \text{ kcal} = 17.1 \% \quad (15)$$

$$\text{Fats (F)} = 133 \text{ g} = 1197 \text{ kcal} = 27.06 \% \quad (16)$$

The percentage of nutrients in the pescatarian diet is illustrated in Figure 1.

The percentage of nutrients

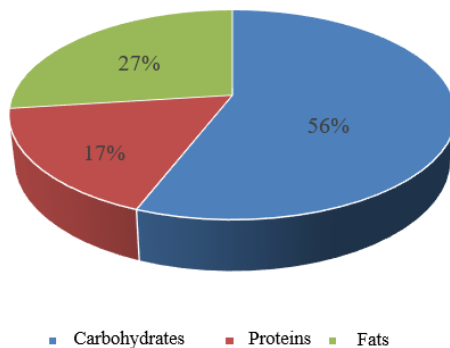


Fig. 1. The percentage of each nutrient in the diet
Source: Own study based on the calculations

The distribution of individual meals in the full-day diet in terms of energy (4423 kcal) is as follows:

$$\text{Energy}_{\text{breakfast}} = 1401 \text{ kcal} = 32.04 \% \quad (17)$$

$$\text{Energy}_{\text{lunch}} = 1810 \text{ kcal} = 40.92 \% \quad (18)$$

$$\text{Energy}_{\text{dinner}} = 1212 \text{ kcal} = 27.04 \% \quad (19)$$

The percentage of each meal in the pescatarian diet is illustrated below in Figure 2.

The percentage of individual meals during a day

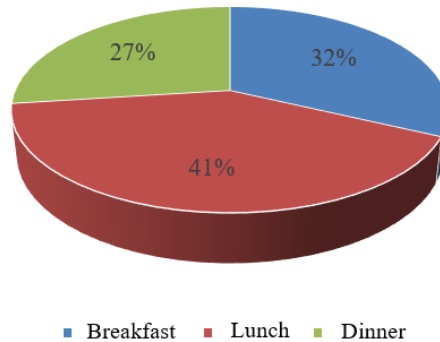


Fig. 2. The percentage of individual meals during a day
Source: Own study based on the calculations

Final conclusions

Pescetarianism is a popular variation of semi-vegetarianism that is characterized by the exclusion of red and white meat from the diet, while maintaining meals prepared on the basis of fish. In addition, this type of diet allows for the consumption of milk, milk products, and eggs, which makes it much easier to compose balanced meals and, consequently, to meet nutritional needs in an optimal way. There are many benefits to feeding military personnel based on the proposed menus. An undoubted advantage of a diet rich in fish is the supply of valuable omega-3 fatty acids (EPA, DHA). Furthermore, vegetarian diets, which include pescetarianism, are characterized by a lower supply of saturated fatty acids and cholesterol and a higher intake of dietary fiber, which may reduce the risk of many health disorders [6]. All these aspects have positive influence on preventing the spread of diet-related modern-age diseases, and therefore translate into the health of military personnel, and consequently allow to maintain the required physical fitness of soldiers and their availability during military service and performance of assigned tasks. It is worth noting that the pescetarian diet can be used in peacetime and in war, both for doing domestic and foreign military tasks. Moreover, it may be an alternative model of feeding troops in emergency situations, when the availability of commonly used products in the nutrition of soldiers is limited, for example due to disturbances in the food supply chains. The added value of using a menu based on an alternative diet – pescetarian diet – is that in the face of overlapping global problems, related to global warming and the ongoing war beyond the eastern border of Poland, which are having an increasing impact on the external and internal security of European

countries, and thus on the standard of living of individual groups, including soldiers, is the possibility of periodic replacement of some food products, for others, perhaps cheaper and more readily available.

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