

UDC 664.87:355.651/.652:001.36(477+100)

COMPARATIVE ANALYSIS OF FIELD RATION FOR MILITARY PERSONNEL OF THE UKRAINIAN ARMY AND ARMIES OF OTHER COUNTRIES WORLDWIDE

M. Mardar, Doctor of Technical (Dr. Hab.) in Science, Professor*, *E-mail: marina_mardar@mail.ru*

M. Hkrupalo, Associate Professor of Combat Service Support**, *E-mail: uadozent@ukr.net*

M. Stateva, Ph. D. Student, *E-mail: stateva.m@mail.ru*

*Faculty of Marketing, Entrepreneurial Management and Trade

Odessa National Academy of Food Technologies, Odessa, 112, Kanatna Street, 65039

** Faculty of Combat Service Support Military Academy, Odessa, 10, Fontanska Doroga Street, 65009

Abstract. For the purpose of improvement of the Ukrainian nutritional standards this Article provides comparative analysis of field rations of different countries worldwide to make a proposal on improvement of food-stuff assortment in food ration for military personnel in the Armed Forces of Ukraine, Army of USA, the British Army, Army of Germany, Army of Italy, Army of Canada, Army of France, Army of Belarus, Army of Armenia. In accordance with the comparative analysis it was established that ration composition used for the Armed Forces of Ukraine military personnel lags behind developed countries of the world both in nutrition arrangement and in nutrient composition, especially in relation to assortment and variety of ration food-stuff. Moreover, a field ration is strictly unified and doesn't consider individual needs of military personnel in calories, proteins, fats, carbohydrates, food fibers. Selection of individual field ration takes to account only age of military personnel, i. e. individual needs related to nutrition composition such as physical abilities, level of physical activity, gender, type of occupation before military conscription and etc. are not considered

The obtained results confirms practicability of assortment products assortment included to field rations for the purpose to correct nutrition rations towards optimal balance for military efficiency of army, adaptation of military personnel to physical and psychological loads.

Key words: field ration, military ration, nutrition ration, military personnel, nutritional standards of nutrition, nutrient composition.

ПОРІВНЯЛЬНИЙ АНАЛІЗ НАБОРУ СУХИХ ПРОДУКТІВ ДЛЯ ВІЙСЬКОВОСЛУЖБОВЦІВ УКРАЇНСЬКОЇ АРМІЇ ТА АРМІЙ ІНШИХ КРАЇН СВІТУ

М.Р. Мардар, доктор технічних наук, професор кафедри*, *E-mail: marina_mardar@mail.ru*

М.М. Хрупа́ло, доцент кафедри тилового забезпечення**, *E-mail: uadozent@ukr.net*

М.С. Статєва, аспірант, *E-mail: stateva.m@mail.ru*

*кафедра маркетингу, підприємництва і торгівлі

Одеська національна академія харчових технологій, м. Одеса, вул. Канатна, 112, 65039

**кафедра тилового забезпечення, Військова академія, м. Одеса, вул. Фонтанська дорога 10, 65009

Анотація. Із метою вдосконалення складу українських норм харчування, проведено порівняльний аналіз набору сухих продуктів різних країн світу, щоб у подальшому внести пропозиції по покращенню асортименту харчових продуктів у складі раціонів для військовослужбовців Збройних Сил України. У статті наведено набір продуктів та нутрієнтний склад продовольчої норми харчування для військовослужбовців Збройних Сил України, армії США, Великої Британії, Німеччини, Італії, Канади, Франції, Білорусії та Вірменії. На основі порівняльного аналізу встановлено, що склад продовольства яке використовується для військовослужбовців Збройних Сил України відстає від розвинених країн світу як в організації харчування, так і в нутрієнтному складі, особливо в асортименті та різноманітності харчових продуктів у раціоні. Також набір сухих продуктів жорстко уніфікований і не враховує індивідуальні потреби військовослужбовців у калоріях, білках, жирах, вуглеводах, харчових волокнах тощо. Вибір індивідуального набору сухих продуктів враховує тільки вік військовослужбовців, тобто не враховує індивідуальні потреби щодо складу раціонів харчування, такі як: фізичні дані, рівень фізичної активності, стать, рід занять до призову в армію та ін.

Отримані результати свідчать про доцільність розширення асортиментного набору продуктів, які входять до складу сухих пайків з метою коригування раціонів харчування в сторону оптимальної збалансованості задля боєздатності армії, забезпечення адаптації організму військових до фізичних та психологічних навантажень.

Ключові слова: набір сухих продуктів, сухі пайки, раціон харчування, військовослужбовці, склад норм харчування, нутрієнтний склад.

Copyright © 2015 by author and the journal "Food Science and Technology".

This work is licensed under the Creative Commons Attribution International License (CC BY). <http://creativecommons.org/licenses/by/4.0>



DOI: <http://dx.doi.org/10.15673/fst.v11i1.293>

Introduction

Sensible nutrition is an important factor of health promotion and safety of military personnel, overcoming

of stressing situations, resistance to large physical loads and keeping of high fighting ability. At the present time special nutrition standards were developed both in Ukraine and abroad that comply with main requirements

to military personnel nutrition. Food provision to military personnel and residents called to arms during mobilization statement is performed according to the approved nutrition standards or military personnel and according to procedure established by "Regulation on Food Provision of Different Countries Worldwide in Piece-Time" [1].

Statement of the Problem

Comparative analysis of military personnel nutrition standards of different countries worldwide is necessary to make further proposals on improvement of food assortment in food composition for the Armed Forces of Ukraine military personnel.

Literature Review

The author of centralized field feeding support, so called "military field kitchen boiling tank" Автором централізованого польового харчування, так званого на той час «воєнно-похідну кухню-самовар» was a resident of Zhmerinka town A. Turchanovich, which is confirmed by patent document from March 8, 1904. Daily food provision standards by military ration were established only in 1934 in USSR and they were changed and supplemented with time. At the present time many works both in media and scientific works of M. P. Gulich, Yu. M. Deputata, I. P. Koziarin, V. N. Korzun, V. Yu. Mykhailets, V. I. Tsypryan and V. E. Shevcheno at el. [2-6] are dedicated to study of military personnel nutrition problems.

Annually worldwide about \$ 1464.0 bln. are spent to sustentation of armed forces [7]. The five top countries spending the highest cost include USA, the People's Republic of China, Russia, Saudi Arabia and the United Kingdom. Ukraine comes 114th in the list of countries according to military expenses according to GDP rate. Based on evaluation of data as on 2017 Ukraine is going to spend 5% of GDP (approximately UAH 129 bln.) [8]. In accordance to the declaration of the AFU logistic service, the Ministry of Defense of Ukraine only in 2015 130 ths of field rations were procured at a cost of UAH 17.3 bln. In 2015 the actual cost of nutrition provision under field condition constituted from UAH 64.00 to UAH 96.00, and under stationary conditions it constituted from UAH 54.66 to UAH 89.75. In 2016 a new modern field unit was developed, which costs UAH 110 per unit supplied with a heater in the basic unit [9].

The quality of military personnel nutrition under field conditions requires special attention. According to Regulation of the Cabinet of Ministers No 426 "On Nutrition Standards of Military Personnel of the Armed Forces, other military groups and State Service of Special Connection and Information Protection, Police, common and command stuff of subdivisions of combat support to areas of Anti-terror operation of the State Fiscal Service, common and command personnel of authorities and sub-

divisions of civil defense" from March 29, 2002 it was established that the dietary factor is included to number of leading effects on health of the Armed Forces of Ukraine military staff with definition of such biological characteristics as organization of body, special properties of metabolism, status of immune system, morbidity and etc. Nutrition ration based on scientific evidences with consideration of military activity specifics will support health promotion and physical development of military staff, elevate resistance to loads and will have positive effect on its fighting ability [10].

Daily field ration is purposed for military personnel nutrition, when it is impossible to cook hot meal from products according to the main standard-[11].

The following requirements are applied to a modern field ration:

- possibility of long-termed storage, products requiring special storage conditions should be excluded;
- products must be ready-to-eat or simple in preparation;
- should include digestible products that don't cause digestive disorders, allergies and etc.;
- packing (usually hermetic of water-proof material) should protect products against soaking and contamination;
- should provide necessary nutrition and caloric value [12].

Study

Under modern conditions during military service the military personnel has to endure significant physical and nervous and psychological stress. Moreover, the compliance of daily ration with scientifically justified principles of sensible ration is very important. The first of them is energetic balance, i. e. caloric value of daily ration should comply with energy consumption of the body. Energy consumption of different categories of military personnel vary in dependence on conditions and character of military activity, and constitutes 3000 kilocalories for officers of headquarters, teachers and some other categories, and comes up to 4500 kilocalories for airborne personnel of jet aviation. Energy consumption of the army constitutes 3500 – 4000 kilocalories [1,5]. According to recommendations of the Special Committee (Research Task Group-154) of NATO energy consumption during regular operations constitutes not less than 3600 kilocalories/day and 4900 kilocalories/day for fighting operations [1,5].

Individual nutrition ration of the military personnel out of a military unit is calculated for energy consumption by one person during a day or per one food intake. Moreover, it is also necessary to notice that field rations are issued during warfare and at repositioning of military staff. In Table 1 it is shown a daily field ration for military personnel of Ukraine according to standard No 10.

Table 1 – Daily field ration for military personnel of Ukraine according to standard No 10 [10]

Name of Product	Quantity per 1 man/day, g		
	Standard №10	Airborne forces, naval establishment	Group of 10 persons
Crackers of first grade wheat flour	300	300	350
Canned meat (meat breakfasts of the highest grade)	325	325	367.5
Canned meat (liver paste)	100	-	100
Canned meat and vegetables (a choice of meat with porridge)	650	650	-
Natural honey	40	20	-
Sugar	90	90	90
Instant coffee	2	2	-
Natural black tea	4	2	6
Paper tissue, pieces	3	3	-
Hygienic tissue, pieces	3	3	-
Black chocolate (cacao not less than 56%)	-	40	-
Dried fruits (raisins)	-	40	-
Minty caramel	-	15	-
Salt	-	6	-
Pepper	-	0,9	-
Different cereals (or paste goods)	-	-	270
Food concentrates of soups	-	-	36
Canned snack vegetables	-	-	120
Vegetable seasoning	-	-	7

In the Ukrainian army the field ration is called Standard No 10 – “Daily Field ration” [10]. It is manufactured in accordance with standard TU-9194-461-04605473-03 (with amendments No 2). Total weight of individual daily nutrition ration (IDNR) constitutes 1625 g, the content weight is 1330 g. In accordance to the label on the package the energetic value constitutes 4800 kilocalories [13], this high-caloric daily menu in the first turn leads to quick satisfying of hunger. The it should be noticed that this ration is not balanced by nutrition value, it is characterized by high

content of fats, carbohydrates, insufficient amount of essential amino acids, vitamins and mineral substances. Similar ration is strictly unified and doesn't consider individual need of military personnel in calories, proteins, fats, carbohydrates, food fibers and etc. Selection of individual field ration considers only age of military personnel, i. e. doesn't consider individual needs related to nutrition ration composition, such as physical abilities (weight, height), level of physical activity, gender, occupation before military conscription [13].

Table 2 – Daily field kit of products for the Ukrainian Army according to Standard No 15 [14]

Name of Product	Ration of breakfast/ supper, gram	Ration of lunch, gram	Quantity per one person, gram
Crackers of first grade wheat flour	50/50	50	150
Biscuits of first grade wheat flour or branny rye flour	0/50	50	100
Ready-to-eat soup (meat borsch or meat soups in assortment) in retort pouch		500	500
Ready-to-eat main course (porridge with meat or vegetables with meat in assortment) in retort pouch	350/350	350	1050
Instant coffee	2/0		2
Tea	0/2	2	4
Sugar	10/10	10	30
Natural honey	0/20		20
Fruit jam (in assortment)		20	20
Ground black pepper		0.3	0.3
Salt	1/1	1	3

Directive No 696 “On amendments introduction to nutrition standards for the Armed Forces military personnel and other military groups” from October 3, 2016 establish-

es provision of standard by portions, i. e. breakfast, lunch and supper taking to account number of rations necessary for provision of military personnel with adequate nutrition.

A new standard No 15 is established, it constitutes a daily field kit of products (Table 2), an improved alternative of daily field ration. Innovations include additional inclusion to the ration of dry fruits, chocolate, coffee, testy soups and main course. Additionally to each ration (breakfast, lunch, supper) the bottled water is issued calculated as 0.5 l per ration independently from season, and as 1 l within period from June 1 to September 1. Due to new packing technologies (retort-package) ready meals will be obtained without previous thermal treatment, which will provide compactness and easy use during use [14].

Constitute an issue for comparison of field ration composition for the Ukrainian Army and armies of other countries or the purpose of its analysis and definition of compliance of the Ukrainian Army rations with existing modern standards and recommendations. The comparison was performed based on analysis both of regulatory materials of different countries and existing publications related to this subject.

In accordance with common practice procurement of military rations in the most countries is performed in compliance with national standards of provision with mandatory consideration of military service type, level of military equipment development and methods of armament, principles of warfare, that eventually should be reflected both in structure of rations and military personnel nutrition arrangement in whole. Provisional standards and rations in armies of other countries are relatively sta-

ble and are continually optimized in relation of its structure (on account of new products inclusion), filling and packaging of rations [1].

The composition of dry MRE unit of USA Army in accordance with menu No 1 "Chili with beans" is provided in Table 3. Four types of individual rations are used in USA troops, e. g. MRE (Meal, Ready-to-Eat), FSR (First Strike Ration), MCW (Meal, Cold Weather) та LRP (Long Range Patrol) [15].

MRE kit is the most common in the Armed Forces of USA. It includes 24 options of menu, it is usually used during 21 days after deployment at warfare. The ration is hermetically packed to a package of thin plastic material. In 2008 new easily opened packages were brought into production. Shelf-life expansion is provided by four-layer structure of the package: polyester, nylon, foil and polyolefine. For the purpose of definition of usability grade of ration a package is equipped with a round orange indicator. After manufacture the central part has lighter color of bigger diameter, with time it becomes darker. Speed of color change is proportional to temperature. If the central part is darker then external one, then the ration is not good for use. Additionally to the indicator the package is labeled with number of menus and name of main course (without soup), starter, dessert and drinks (tea, coffee or cacao as well as lemonade). Each ration has salt, two gummies, matches, several sheets of toilet paper, wet tissue and a plastic spoon [1,15].

Table 3 – Composition of MRE field ration of USA Army according to menu No 1 [1,15]

Name of product	Quantity, g	Name of product	Quantity, g
Chili with beans	227	Chocolate bakery food	52
Procesed cheese	43	Bread	71
Instant strawberry-cream drink	70	Cracker	37.8
Instant coffee	1.7	Sugar	4
Dried cream	4	Iodine-treated salt	4
Red ground pepper	2		

Nutrient composition of dry MRE units (in gram) includes proteins – 126 (including animal-derived – 83); fats – 157; hydrocarbons - 528; energetic value – 3995 kilocalories, calcium – 1705 mg, iron – 26 mg, sodium – 6850 mg [1].

FSR kit is designed for military personnel nutrition during 72 hours, under conditions of military mission far away from its subdivision with intense relocations and loads. Special features of the ration: sandwiches, canned fish and chicken, high-caloric drinks, dry beef, chocolate and other products. FSR kit has half the weight and half the size of MRE kit designed for one day. For the purpose of military personnel equipment weight reduction FSR ration is designed to provide use of only one package instead of three MRE rations per a day. Nutrient composition of the represented ration (per 100 g) includes proteins – 13; fats – 34; hydrocarbons – 53. Energetic value constitutes 2900 kilocalories, calcium – 655 mg, iron – 15 mg, sodium – 4034 mg [1,15].

MCW and LRP kits are designed for military personnel nutrition during military mission far away from their subdivision under low temperatures or during long-termed operation with intense relocations. Main consumers of these rations are marine corps and USA special Operations Forces. Shelf-life of the rations are the same as of MRE, but completed studies showed that the shelf-life of the main course is significantly longer. Main course in composition of kits is frozen or dry. Moreover, the ration composition includes cheese, butter, cookies, nuts, chocolate bars, candies, sugar, coffee, high caloric drinks, a plastic spoon. Additional drinks for liquid replenishment are supplied under condition of dry meal. Limitation of sodium in rations prevents dehydration under low temperatures [1]. Nutrient composition of MCW and LRP kits (per 100 g) includes: protein – 14; fats – 34; hydrocarbons – 52. Energetic value of MCW – 2461 kilocalories, calcium – 1690 mg, iron – 29 mg, sodium – 7715 mg. Energetic value of LRP kit constitutes 1540 kilocalories, calcium – 563 mg, iron – 10 mg, sodium – 2572 mg [1,15].

The American scientists continue to conduct studies relating menu and packages of the ration according to results of the ration use during warfare. Its modernization constitutes a part of Assault Special Purpose Improvement Program (ASPIP). In accordance with this program it is planned to increase number of menu options up to nine with optimal content of hydrocarbons, vitamins, amino acids, caffeine and antioxidants [16]. Improvement of food quality or military personnel of Special Operations Forces will allow to improve its physical and psychological state during military mission under an weather conditions.

Nutrition of the military personnel of the British Army is also performed according to unified ration that is applicable to all types of troops (Table 4). The British ration is called as multiclimatic ration. The British field rations are designed to be used during 24 hours. Basic nutrition of the army (and country population) includes meat, fish, milk, vegetables and fruits. Strict fulfillment of conventional regimen of nutrition designed for four food intakes is remarkable. It includes first breakfast, lunch, dinner and tea-time [12]. The rations are balanced and approximated by consumption properties to regular food. Shelf-life of products is designed for 5 years.

Table 4 – Composition of the United Kingdom Army ration [1,16]

Name of product	Quantity, g	Name of product	Quantity, g
Bread and bun goods	340	Cheese	50
Wheat flour	70	Sugar	60
Cereal, beans	60	Salt	14
Paste goods	44	Coffee, cacao	4
Meat	175	Tea	2
Bacon, ham	85	Spices, seasoning	10
Fish	45	Potato	453
Fats, margarine	42	Vegetables	284
Vegetable oil	20	Fresh fruits	125
Butter	25	Fry fruits	25
Fresh milk	405	Jam marmalade	62

Chemical composition and energetic value of this ration is as follows: proteins – 107 (including animal derived – 65); fats – 155; hydrocarbons – 618; energetic values – 4294 kilocalories, calcium – 1444 mg, iron – 21 mg, sodium – 8293 mg [1].

Main field of further optimization of nutrition rations for the British military personnel besides optimization of organizational feeding includes also study related to creation of new individual rations designed for food provi-

sion to forces of quick deployment during warfare at full separation of subdivisions from foodstuff provision bases. The ration kits include products maximally prepared for consumption. Product kits with comparable caloric capability are used one after another for 3-4 days [17].

In Germany a field ration is called Military Combat Ration, or Einmannpackung (EPa), and it is designed for 2 food intakes. The ration composition is provided in Table 5 and it is used at high physical load [1,17].

Table 5 – Composition of field rations of the German Army [1,17]

Name of product	Quantity, g	Name of product	Quantity, g
Wheat bread	340	Cheese	25
Wheat flour	45	Sugar	50
Cereals, bean concentrates	90	Salt	14
Paste goods	30	Coffee, cacao	14
Meat	200	Tea	1
Smoked meat	75	Spices, seasoning	12
Fish	50	Potato	430
Fats, bacon	50	Fresh vegetables	270
Canned products	102	Fresh fruits	150
Butter	30	Jam marmalade	35
Fresh milk	430		

In the German Army a differentiated approach is applied to nutrition of military personnel. Daily ration dependently on energetic consumptions volumes may be of three types; at low physical load the caloric capability doesn't exceed 2800 kilocalories, at middle – 3152 and at high physical load it comes up to 3524 kilocalories [1]. On basis of energetic value the German ration includes

proteins – 96 g (including animal deriveds – 60 g), fats – 126 g and hydrocarbons in amount of 501 g. Its energetic value constitutes 3524 kilocalories, calcium – 900 mg, iron – 19 mg and sodium – 8300 mg [1].

Nature of the German population nutrition is reflected also in provision of the military contingents. Meat products (sausages, ham, bockwursts) are widely used in the ra-

tion, including also soup preparation. The meat is used as a part of main course, usually in natural form and more seldom as minced meat. Potato and different vegetables, e. g. cabbage, bean pods, carrot, beans, pea are widely used as garnish. The German army also has kits of individual rations the part of which recently was elevated from 20 to 40 %

[17]. The following products (Table 6) are included to one of the individual ration options. It is necessary to notice that food concentrates that are manufactured in the mass scale in Germany are widely used in the military rations (15.5 kg per head of population annually).

Table 6 – Composition of one of individual ration options for the military personnel of German Army [1,17]

Name of product	Quantity, g	Name of product	Quantity, g
Crackers (2 × 125)	250	Sugar (3 × 12,5)	38
Cans (beef in fat)	100	Tea (2 × 2,4)	4,8
Cans (sausage for beer)	100	Coffee	3,5
Food concentrates of soup and main course containing 80 g of pork	300	Chocolate	50
		Canned orange and grape juices	30
			30

The Italian field ration is called Special Military Ration Pack. One field ration is designed for 3 food-intakes: breakfast, lunch and supper. The nutrition ration of the Italian Army military personnel includes different products: paste goods, vegetables, fruits, beef, low fat pork, wine, spices and etc. Standards of daily provision by soldier ration are provided in Table 7. Traditional Ital-

ian food is widely represented in nutrition norms – spaghetti, cannelloni, lasagna dressed with tomato sauce, cheese, meat, beans and vegetables [5]. Regimen of military personnel varies: breakfast is light, includes bread, cheese, coffee; dinner is caloric and includes starters, soup and main course, wine; supper includes cold main course, salad and drinks [17].

Table 7 – Composition of special military ration of the Italian army [1,17]

Name of product	Quantity, g	Name of product	Quantity, g
Wheat bread	420	Sugar	20
Rise	80	Salt	20
Paste goods	200	Coffee	4
Meat	160	Spices, seasoning	25
Fish	80	Fresh vegetables	300
Olive oil	40	Tomatoes	75
Butter	15	Dry vegetables	60
Milk	200	Fruits	300
Cheese	40	Dry grape wine	500

The nutrient composition of the ration (in 100 g) includes: proteins – 100 (including animal derived – 63); fats – 129; hydrocarbons – 521; energetic value – 3650 kilocalories, calcium – 1079 mg, iron – 33 mg, sodium – 5250 mg [1].

The Canadian individual field rations are called Supper Menu (меню на вечерю) або Individual Meal Pack (IMP). The Canadian individual field rations are

design for 3 food-takes. They include soup (mashroom, chicken or tomato), main course (meat, omelette, chicken and etc.), fruits and desserts (peaches, apples, cherries, strawberries, muesli, jam and etc.), drinks (tea, coffee, cacao, fruit soluble mixes) and dining minor items such as bisquits, tissue, salt and pepper, matches, toothpeaks, gummies, spoons, sauces and etc (Table 8).

Table 8 – Composition of individual field ration of the Canadian army [1,17]

Name of product	Quantity, g	Name of product	Quantity, g
Wheat bread	420	Sugar	20
Rise	80	Salt	20
Paste goods	200	Coffee	4
Meat	160	Spices, seasoning	25
Fish	80	Fresh vegetables	300
Olive oil	40	Tomatoes	75
Butter	15	Dry vegetables	60
Milk	200	Fruits	300
Cheese	40	Dry grape wine	500

The nutrient composition of the ration above includes proteins – 141 g (including animal derived –

75 g), fats – 123 g, hydrocarbons – 681 g; energetic value is 4395 kilocalories, calcium constitutes 1016 mg, iron constitutes 26 mg, sodium constitutes 9381 mg [1].

The French field ration is called Individual Re-
eatable Combat Ration, and designed for 24 hours. It in-
cludes 2 main courses (ready-to-cook products, meat
with salad, fish with potato, chicken with vegetables and

rise, etc.) and a starter (usually canned fish). Also a pack-
age of instant soup, biscuits, drops, cheese sauce and ca-
cao with sugar (Table 9).

Table 9 – Composition of a field ration for the French Army military personnel [1,17]

Name of product	Quantity, g	Name of product	Quantity, g
Stewed turkey	300	Cacao	20
Ragout with beans	300	Sugar	44
Liver paste	10	Salt, pepper	6
Cheese	42	Nougat	40
Tomato soup	41	Fruit soup	30
Cookies	280	Chocolate	25
Coffee	42	Candies	24
Cream for coffee	19	Caramel	40
Instant drink	21		

For successful performance of the mission out of
stationary location of military subdivisions attached for
rations the foreign armies provide several options of field
ration [1,17]. This way 24-hour field ration of NATO in-
cludes menu “A”, “B”, “C”, “D”, “E”, “F”, “G”, that
contain besides various starters, main courses and drinks,

including gummies, matches, matches for all types of
weather, toilet paper, tablets for water purification. The
options of content may vary in dependence on assortment
of products at the moment of packing. One field ration
for NATO military personnel is represented in Table 10
as example.

Table 10 – Composition of field ration for NATO military personnel [1,17]

Name of product	Quantity, g	Name of product	Quantity, g
Stewed beef	300	Sugar (3 × 12.5)	38
Turkey with beans	300	Cream for coffee (2 × 3)	6
Liver paste	200	Salt	3
Jam (2 × 25)	50	Biscuit (2 × 125)	250
Tea (2 × 1,2)	2,4	Chocolate	80
Coffee (2 × 3,5)	7	Fruit powder for drink (2 × 30)	60

The nutrient composition of the ration above (in
100 g) includes proteins that constitute 104 (including
animal derived – 56 g); fats constitute 114; hydrocarbons
constitute 440; the energetic value constitutes
3200 kilocalories, calcium is >800 mg, iron is 20 mg [1].

tablishment of standards for ration provision to military
personnel and feeding of staff animals in the Armed
Forces during peace time and the procedure of its appli-
cation” 4 standards for military personnel nutrition were
established [19] (Table 11).

By the Order of the Minister of Defense of the
Republic of Belarus No 3 from January 3, 2013 “On es-

Table 11– Composition of common military ration for military personnel of the Belorussian Army [19]

Name of product	Quantity, g	Name of product	Quantity, g
Bread of 1 st grade wheat and rye flour mixture	250	Gutted fish without head	100
Bread of highest grade wheat flour	70	Sunflower oil	35
Ban of highest grade wheat flour	160	Butter	30
1 st grade wheat flour	15	Milk or kefir	100
Different cereals	110	Sour-cream, cheese	30
Paste goods	35	Solid rennet cheese	15
Meat (1 st grade beef, pork)	100	Sugar	60
Bird meat	100	Salt	20
Tea	2	Ground pepper	0.3
Dry bay leaf	0.2	Ground mustard	0.6
Tomato paste	6	Fresh vegetables	830
Natural fruit and berry juices, fresh fruits	100	Jelly concentrate (or dry fruits)	30

The nutrient composition of the Belorussian ration
(in gram) includes proteins – 121 (including animal de-
rived – 68); fats – 157; hydrocarbons – 368; energetic

value constitutes 3450 kilocalories. Gross weight is
1.7 kg. Shelf-life is 2 years.

There are six field rations for military personnel of
the Armenian Army, including airmen, patients of mili-

tary hospitals and students of military colleges. Special ration No 6 is established for soldiers called to the front-line and subject to greater physical loads, when they need more calories. This military personnel undergoes greater

psychological stresses, so their ration contains more sweets, jam, cookies, condensed milk, chocolate, caramel (Table 12).

Table 12– Composition of the Armenian Army ration [20]

Name of product	Quantity, g	Name of product	Quantity, g
Military crackers	100	Meat with pea and potato	250
Sugar	30	Muesli bars (2 ×40)	80
Canned meat and vegetables	250	Instant soups	100
Porridge with beef (beef, sunflower oil, barley, onion, salt, ground black pepper)	250	Tea (2 ×2,4)	30
Jam	45	Coffee	30

The nutrient composition of the ration above includes proteins – 108 g (including animal derived – 65 g), fats – 116 g, hydrocarbons – 593 g; energetic value constitutes 3895 kilocalories [20].

Conclusions

Based on the comparative analysis it was established that food products included to individual rations for military personnel of foreign armies are represented in wide range. The most of them are canned, which provides longer storage and plays essential military applicable role (protection against different types of contamination). Use of heating devices supplied in the kit allows to elevate its nutrition properties on account of improvement of organoleptic parameters. Multifunctionality of

the rations above is provided also by means of water purification that allows to solve extremely important hygienic problem as provision of the military personnel under field conditions not only with food products, but also with safe drinking water.

The comparison above of nutrition in the Ukrainian Army with armies of NATO members confirms that in this field Ukraine lags behind developed countries both in nutrition arrangement and in nutrient composition, especially in assortment and variability of different food products in ration. The national nutrition standards require essential correction towards optimal balance for provision of fighting ability of the army and adaptation of the military personnel to physical and psychological loads.

References:

1. Nutrition Science and Food Standards for Military Operations (Nutrition et normes d'alimentation pour les opérations militaires). Final Report of RTO Task Group. Mode of access: URL: natorto.cbw.pl/uploads/2010/3/TR-HFM-154-ALL.pdf
2. Hulich MP. Zdorovia liudyny: naukovi osnovy kharchuvannia. Zdorovia Ukrainy. 2003; 1: 38-39.
3. Kozariin IP, Ivakhno OP. Pytannia bezpechnosti vykorystannia kharchovykh produktiv, shcho mistiat nanochastynky. Zbirnyk naukovykh prats spivrobotnykiv NMAPO im. P. L. Shupyka. 2014; 23(3): 54-62. Rezhym dostupu: [http://nbuv.gov.ua/UJRN/Znpsnmapo_2014_23\(3\)_10](http://nbuv.gov.ua/UJRN/Znpsnmapo_2014_23(3)_10).
4. Deputat luM, Hulich MP, Vinokurova NM. Hihienichna otsinka dobovoho ratsionu kharchuvannia viiskovosluzhbovtiv strokovoï sluzhby ZS Ukrainy. Hih. nasei. mists. 2004; 44: 559– 563.
5. Starodubtsev SO, Kushneruk luI, Trobiuk VI. Matematychni modeli optymizatsii ratsioniv kharchuvannia viiskovosluzhbovtiv. Systemy ozbroiennia i viiskova tekhnika. 2008; 2: 111-114.
6. Karpenko PO, Peresichna SM, Hryshchenko IM, Melnychuk NO, za zah. red. Karpenka PO. Osnovy ratsionalnoho i likuvalnoho kharchuvannia: (navch. Posib): Kyiv. nats. torh.-ekon. un-t; 2011.
7. Pro prodovolche zabezpechennia Zbroinykh Syl Ukrainy na mymyi chas (nakaz vid 20.12.2002 № 402): Rezhym dostupu : <http://zakon4.rada.gov.ua/laws/show/z0992-02/page5>. – Nazva z ekranu
8. Nazvano biudzheth ukrainskoi armii u 2017 rotsi. Rezhym dostupu: <http://fakty.ictv.ua/ru/ukraine/20160906-nazvano-byudzheth-ukrayinskoyi-armiyi-u-2017-rotsi/> – Nazva z ekranu
9. Viiskovyi biudzheth-2017: Skilky Ukraina vytratyt na tekhniku i oboronu (Tablytsia). Rezhym dostupu : <http://www.depo.ua/ukr/war/proekt-viiskovogo-byudzhetu-2017>
10. Viiskovyi biudzheth – 2017: Skilky Ukraina vytratyt na tekhniku i oboronu (Tablytsia). Rezhym dostupu : <http://www.depo.ua/ukr/war/proekt-viiskovogo-byudzhetu-2017>
11. Sukhyi paiok. Rezhym dostupu : https://uk.wikipedia.org/wiki/Sukhyi_paiok
12. Osnovni vymohy do sukhykh paikiv. Rezhym dostupu: <http://faqukr.ru/i/za-ta-napoi/92796-suhij-pajok-suhij-pajok-rosijskoi-armii.html>
13. Fedosova KS, Telezhenko LM. Porivniannia ratsioniv kharchuvannia v ukrainskii armii i v armiiakh inshykh krain. Kharchova nauka i tekhnolohiia. 2009; 4(9): 17-21
14. Postanova vid 3 zhovtnia 2016 r. № 696 «Pro vnesennia zmin do norm kharchuvannia viiskovosluzhbovtiv Zbroinykh Syl ta inshykh viiskovykh formuvan». Rezhym dostupu: <http://www.kmu.gov.ua/control/ru/cardnpd?docid=249395818>
15. Shcho vkhodyt v sukhi paiky Zbroinykh Syl SShA. Rezhym dostupu : <http://uapress.info/ru/news/print/26995>
16. Sukhi paiky VS SShA. Rezhym dostupu: <http://vin-inform.com.ua/225-suhie-payki-vs-ssha-voyna-voynoy-a-obed-po-raspisaniyu.html>
17. Sukhi paiky (IRP) riznykh krain svitu. Rezhym dostupu : <http://www.surv24.ru/blogs/2013/07/27/sukhye-paiky-yrp-raznikh-stran-myra/>
18. Sukhoi paek: chem kormiat sovremennoho soldata. Rezhym dostupu: <http://militaryarms.ru/obmundirovanie/suhoy-paek/>
19. Nakaz Ministra oboron Respubliki Bilorus vid 3.01.2013 r № 3 "Pro vstanovlennia norm zabezpechennia prodovolstvom viiskovosluzhbovtiv ta hoduvannia shtatnykh tvaryn v Zbroinykh Sylakh v mymyi chas i poriadok yikh zastosuvannia". Rezhym dostupu: http://www.mil.by/ru/all_about/remunerations_norms/
20. Ratsion soldativ v Virmenii. Rezhym dostupu : <http://ru.armeniasputnik.am/armenia/20160627/4057908.html>

СРАВНИТЕЛЬНЫЙ АНАЛИЗ НАБОРА СУХИХ ПРОДУКТОВ ДЛЯ ВОЕННОСЛУЖАЩИХ УКРАИНСКОЙ АРМИИ И АРМИЙ ДРУГИХ СТРАН МИРА

М. Р. Мардар, доктор технических наук, профессор кафедры*, E-mail: marina_mardar@mail.ru
Н.Н. Хрупало, доцент кафедры тылового обеспечения**, E-mail: uadozent@ukr.net

М.С. Статева, аспирант, E-mail: stateva.m@mail.ru

*Кафедра маркетинга, предпринимательства и торговли

Одесская национальная академия пищевых технологий, г. Одесса, ул. Канатная, 112, 65039

**Кафедра тылового обеспечения, Военная академия г. Одесса, ул. Фонтанская дорога 10, 65009

Аннотация. С целью усовершенствования состава украинских норм питания в статье проведен сравнительный анализ набора сухих продуктов разных стран мира, чтобы в дальнейшем внести предложения по улучшению ассортимента пищевых продуктов в составе пищевых рационов для военнослужащих Вооруженных Сил Украины. В статье приведен набор продуктов и нутриентный состав продовольственной нормы питания для военнослужащих Вооруженных Сил Украины, армии США, Великобритании, Германии, Италии, Канады, Франции, Белоруссии, Армении. На основе сравнительного анализа установлено, что состав продовольствия который используется для военнослужащих Вооруженных Сил Украины отстает от развитых стран мира как в организации питания, так и в нутриентном составе, особенно в ассортименте и разнообразии пищевых продуктов в рационе. Также набор сухих продуктов жестко унифицирован и не учитывает индивидуальные потребности военнослужащих в калориях, белках, жирах, углеводах, пищевых волокнах и др. Выбор индивидуального набора сухих продуктов учитывает только возраст военнослужащих, то есть не учитывает индивидуальные потребности в составе рационов питания, такие как: физические данные, уровень физической активности, пол, род занятий до призыва в армию и др. Полученные результаты свидетельствуют о целесообразности расширения ассортиментного набора продуктов, входящих в состав сухих пайков с целью корректировки рационов питания в сторону оптимальной сбалансированности для боеспособности армии, обеспечение адаптации организма военных к физическим и психологическим нагрузкам.

Ключевые слова: набор сухих продуктов, сухие пайки, рацион питания, военнослужащие, состав норм питания, нутриентный состав

Список литературы:

1. Nutrition Science and Food Standards for Military Operations (Nutrition et normes d'alimentation pour les opérations militaires). Final Report of RTO Task Group. [Electronic Resource]. – Mode of access: URL: natorto.cbw.pl/uploads/2010/3/TR-HFM-154-ALL.pdf
2. Гулич М.П. Здоровье человека: научные основы питания [Текст] / М.П. Гулич // Здоровье Украины. - 2003. - № 1. - С. 38-39
3. Козырин И. П. Вопрос безопасности использования пищевых продуктов, содержащих наночастицы [Текст] / И. П. Козырин, А. П. Ивахно // Сборник научных трудов сотрудников НМАПО им. П. Л. Шуплика. – 2014. – Вып. 23 (3). – С. 54-62. – Режим доступа: [http://nbuv.gov.ua/UJRN/Znpnsmapo_2014_23\(3\)_10](http://nbuv.gov.ua/UJRN/Znpnsmapo_2014_23(3)_10).
4. Депутат Ю. М. Гигиеническая оценка суточного рациона питания военнослужащих срочной службы ВС Украины [Текст] / Ю. М. Депутат, М.П. Гулич, Н.М. Винокурова // Гиг. насел. мест. – 2004. – Вып. 44. – С. 559- 563.
5. Стародубцев С. А. Математические модели оптимизации рационов питания военнослужащих [Текст] / С. А. Стародубцев, Ю. И. Кушнерук, В. И. Тробиюк // Системы вооружения и военная техника. – 2008. – № 2. – С. 111-114. (Научные основы рационального питания военнослужащих: Учеб. Пособ. – Вольск: ВВУТ, 1995. – 356 с.)
6. Основы рационального и лечебного питания: [учеб. пособие.] / [П. А. Карпенко, С. М. Обычная, И. М. Грищенко, Н. А. Мельничук, под общ. ред. П. А. Карпенко. – М.: Киев. нац. торг.-экон. ун-т, 2011. – 504 с.
7. О продовольственном обеспечении Вооруженных Сил Украины в мирное время (приказ от 20.12.2002 № 402). [Электронный ресурс] – Режим доступа: zakon4.rada.gov.ua/laws/show/z0992-02/page5. – Название с экрана
8. Назван бюджет украинской армии в 2017 году – [Электронный ресурс] Режим доступа: <http://fakty.ictv.ua/ru/ukraine/20160906-nazvano-byudzheta-ukrayinskoj-armii-u-2017-rotsi/> – Название с экрана.
9. Военный бюджет-2017: Сколько Украина потратит на технику и оборону (Таблица) – [Электронный ресурс]. Режим доступа: <http://www.depo.ua/ukr/war/proekt-viyskovogo-byudzheta-2017>
10. Нормы питания военнослужащих Вооруженных Сил и других военных формирований, утвержденных постановлением Кабинета Министров Украины от 29 марта 2002 № 426 / Официальный вестник Украины. – 2002. – № 14. – ст. 739; 2013, № 100. – ст. 3663.
11. Сухой паек [Электронный ресурс] – Режим доступа: https://uk.wikipedia.org/wiki/Сухой_пайок
12. Основные требования к сухим пайкам [Электронный ресурс] – Режим доступа: <http://faqur.ru/izha-ta-narpoi/92796-suhij-pajok-suhij-pajok-rojsijskoj-armii.html>
13. Федосова К.С. Сравнение рационов питания в украинской армии и в армиях других стран [Текст] / Л.С. Федосова, Л. Тележенко // Пищевая наука и технология. – 2009. – № 4 (9). – С. 17-21
14. Постановление от 3 октября 2016 № 696 «О внесении изменений в нормы питания военнослужащих Вооруженных Сил и других военных формирований» [Электронный ресурс] – Режим доступа: <http://www.kmu.gov.ua/control/ru/cardnpd?docid=249395818>
15. Что входит в сухие пайки вооруженных сил США [Электронный ресурс] – Режим доступа: <http://uapress.info/ru/news/print/26995>
16. Сухие пайки ВС США [Электронный ресурс] - Режим доступа: <http://vin-inform.com.ua/225-suhie-payki-vs-ssha-voyna-voinoy-a-obed-poraspisaniju.html>
17. Сухие пайки (ИРП) различных стран мира [Электронный ресурс] – Режим доступа: <http://www.surv24.ru/blogs/2013/07/27/suhie-payki-irp-raznykh-stran-mira/>
18. Сухой паек: чем кормят современного солдата [Электронный ресурс] - Режим доступа: <http://militaryarms.ru/obmundirovanie/suhoy-paek/>
19. Приказ Министра обороны Республики Беларусь от 3.01.2013 г. № 3 "Об установлении норм обеспечения продовольствием военнослужащих и кормления штатных животных в Вооруженных Силах в мирное время и порядке их применении» [Электронный ресурс] – Режим доступа: http://www.mil.by/ru/all_about/remunerations_norms/
20. Рацион солдат в Армении [Электронный ресурс] – Режим доступа: <http://ru.armeniasputnik.am/armenia/20160627/4057908.html>

Отримано в редакцію 20.01.2017
Прийнято до друку 23.02. 2017

Received 20.01.2017
Approved 23.02. 2017