

# The problem of ensuring food security of the Russian Federation and sustainable development of the economy in the context of energy indicators and rates of human food consumption

*K.A. Vorobev, T.S. Orlova, and L.N. Safiullin*

Ural State University of Economics, Yekaterinburg. Russia

**Abstract.** In this article, the authors consider the problem of ensuring food security of territories as one of the areas of sustainable economic development. The authors' studies have shown that solution to this problem largely depends on the regulation at the state level of individually balanced human nutrition in order to ensure the optimal ratio of the components necessary for life.

## 1 Introduction

Considering the main problem of ensuring sustainable development of the Russian economy in terms of ensuring food security, it shall be noted that in order to accomplish this task, it is necessary to arrange provision of consumers with constant access to the rational food product. Human nutrition shall be balanced in the context of the optimal ratio of fats, proteins, carbohydrates, minerals, vitamins in the diet and the correspondence of the daily caloric content of a person's food to his/her individual energy consumption. This is necessary in order for the population of the country to have the opportunity to be economically active for as long as possible due to high-quality and balanced nutrition that ensures the continuation of life. Nevertheless, the problem of ensuring food security in Russia in the context of sustainable economic development has objective distinctive features and cannot be put on a par with the problem of hunger and food security in Asia and Africa.

## 2 Materials and methods

Table 1 provides the range of averaged rates of physiological nutritional requirements for able-bodied persons in the age of 18-59 is systematized on the basis of the basic nutritional elements indicated in the recommendations of Rospotrebnadzor MR 2.3.1.2432-08 [7] and other sources [9], since the human body in normal development requires more than 600 food components.

**Table 1.** Range of averaged daily rates of nutritional needs of a person in the age of 18-59

Basic nutritional elements, unit of measure	Daily rate
Human energy consumption per day, kcal	1800 - 4200
Proteins, g	58 – 117
of which, animal proteins, g	32 – 64
Carbohydrates, g	257 – 586
Fats, g	60 – 154
Minerals	
P, mg	1200
Ca , mg	800
Fe , mg	18
Zn , mg	15
I, mg	0,15
Vitamins	
A (retinol), mg	0,8 – 1
B1 (thiamine), mg	1,1 – 2,1
B2 (riboflavin), mg	1,3 – 2,4
B6 (peridoxin), mg	1,8 – 2,0
B9 (folacin), mg	0,2
B12 (cyanocobalamin), mg	0,003
C (ascorbic acid), mg	70 – 80
E (tocopherol), mg	8 - 10
PP (niacin), mg	14 – 28

Rationality of nutrition is determined by reimbursement of the body's energy consumption, which are expressed in calories, kilocalories (kcal), reflecting the energy value of food products. The average values of energy metabolism for an adult in Russia are summarized in Table 2.

**Table 2.** Average values of the daily rates of energy metabolism of an adult in Russia considering the gender, weight, and age

Daily energy exchange for men, kg / kcal		
Weight, kg	18-39 years, kcal	40 – 75 years, kcal
55	1430-1520	1240-1350
60	1500-1590	1300- 1410
65	1570-1670	1430-1550
70	1650-1750	1500-1620
75	1720-1830	1500-1620
80	1810-1920	1570-1700
85	1900-2010	1640-1780
90	1990-2110	1720-1870
Daily energy exchange of women, kg / kcal		
Weight, kg	18-39 years, kcal	40 – 75 years, kcal
45	1120-1150	1030-1080
50	1190-1230	1100-1160
55	1260-1300	1160-1220
60	1340-1380	1230-1300
65	1410-1450	1290-1370
70	1490-1530	1360-1440
75	1550-1600	1430-1510
80	1630-1680	1500-1580

From the above data, it follows that the signs of complete, partial starvation of a person are due to many different nutritional indicators of the diet and energy exchange, as well as

many relevant indicators of gender, age, weight, the nature of a person's activity, his/her place of residence, traditions, and etc. Their severity for health, life a person, considering his/her daily food, is determined by the level of energy adequacy, the amount of energy reserve and necessary substances in the human body. The initial energy imbalance is usually covered by human glycogen in the amount of 1500-2500 kcal, which provides the energy requirement of a starving person per one day in conditions of relative rest.

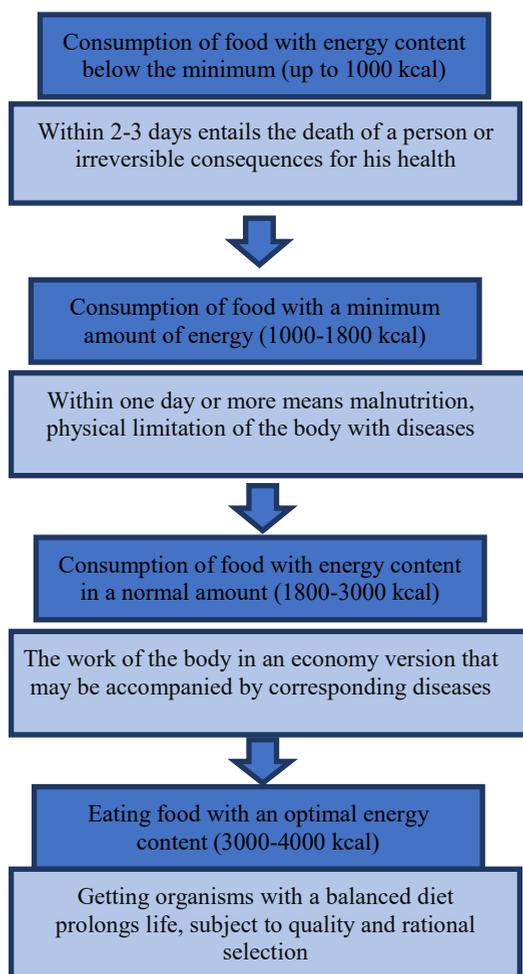
According to the data of domestic studies, it was concluded that insufficient food leads to the decrease in the total energy requirements of the body and the corresponding weight of the person in the range of 30-35 %. The decrease in human body weight within 45-50 % of the normal (initial) value is considered incompatible with life.

### **3 Results and discussion**

Based on the foregoing, with some convention due to the individual characteristics of the human diet, we conclude that the main energy indicators of food consumed by a person include:

- 1) consumption of food with an energy below the minimum (up to 1000 kcal) for 2-3 weeks entails the death of a person or irreversible consequences for his/her health;
- 2) consumption of food with an energy in a minimum scope (1000-1800 kcal) for 1 day or more means malnutrition, physical limitation of the human body and entails the corresponding human diseases;
- 3) consumption of food with an energy in the normal scope of 1800-3000 kcal means the body's work in a limited economical version, which may be accompanied by corresponding diseases;
- 4) consumption of food with an energy in the optimal volume of 3000-4000 kcal means that the body receives a balanced diet, which prolongs life, subject to the conditions of the quality and diet of this food.

The provided generalized energy indicators of a food product consumed by humans are shown in Figure 1.



**Fig. 1.** Generalized norms of energy indicators of food consumed by humans

Wherein, it is worth focusing on the peculiarities of the territorial residence of a person, which are characterized by objective factors of ensuring food security and sustainable development of the Russian economy and play an important role in providing people with food.

Distinctive features of ensuring food security in Russia, in our opinion, can be defined as follows:

1) supplemented and refined elements of the official Food Security Doctrine that provide:

- establishment of the FS Doctrine measures by the norms of strategic planning, which form the corresponding directions of state policy;

- determination of the Russia's food security in the context of its food independence - self-sufficiency in the main types of Russian agricultural products, foodstuffs, and raw materials;

- designation of rational norms of food consumed by a person in accordance with the developed scientific modern principles of nutrition considering the range of averaged norms of daily food needs of a person, and the developed generalized norms of energy indicators of food consumed by a person;

- development in the FS Doctrine of strategic provisions of national security and generic economic security of Russia;
- the FS Doctrine shall consider the recommendations of the UN FAO only in relation to the maximum share of imported food and the volume of food reserves;
- due to the fact that based on the studies of domestic and foreign authors [2, 5], in Russia, in contrast to the African and Asian regions, the problem of hunger and malnutrition is not so acute, it is necessary to consider the list of national interests of the FS sphere characteristic of Russia, which reflect the measures to eliminate the identified main problems of ensuring the food security of the population (providing the population with constant access to rational, high-calorie food and pragmatic use, protection of the land resource as the main source of food production).

## 4 Results and discussion

There are objective general features of ensuring food security in Russia substantiated by the study that must be reflected in official documents related to the country's food security and sustainable economic development.

According to foreign researchers [1, 3, 4, 6], in Russia there is no threat of a population explosion, as noted in Asia and Africa, which predetermines the characteristic differences of the Russian FS system from general measures to ensure the FS in the context of global growth in the world population, which are reflected in various economic studies [11] and doctrinal documents of the Russian Federation on demographic policy [8].

The factors of increasing global competition in the context of the FS are complicated by the unresolved issues in Russia from the number of institutional social problems: significant social inequality and regional disproportion; presence of barriers to development of the agro-industrial complex; weak feedback between science, education and business; insufficient competition in some agricultural areas; poor development of social capital; depletion of traditional raw materials; the need to reform the health care system [10].

Therefore, the first main problem in ensuring the food security and sustainable development of the economy of the Russian Federation shall be clarified and reflected in the Doctrine of the Russian Federation in the form of a provision on providing the population with constant access to food considering its energy and functional content based on the objective characteristics of the territorial residence of a person (absence in Russia of starving people, the threat of a population explosion, and etc.), as well as from the individual characteristics of health and the human body.

## References

1. D. Bazzana, B. Zaitchik, G. Gilioli, *Structural Change and Economic Dynamics* (2020)
2. F. Ceballos, S. Kannan, B. Kramer, B. *World Development*, **136**, 105069 (2020)
3. T. Hua, W. Zhao, S. Wang, B. Fu, P. Pereira, *Conservation and Recycling*, **163**, 105102 (2020).
4. L. Van Geffen, E. van Herpen, S. J. Sijtsma, *Conservation and Recycling*, **163**, 105041 (2020)
5. Z. M. Gitonga, M. Visser, C. Mulwa, *World Development Perspectives*, **20**, 100239. (2020)
6. Z. Xu, Z. Zhang, H. Liu, F. Zhong, J. Bai, S. Cheng, *Food Policy*, 101918 (2020).
7. Methodical recommendations MP 2.3.1.2432-08 "Norms of Physiological Needs for Energy and Nutrients for Various Groups of the Population of the Russian Federation"

- (approved by Chief State Sanitary Doctor of the Russian Federation on December 18, 2008), <https://base.garant.ru/2168105/>
8. Decree of the President of the Russian Federation dated May 07, 2012 No. 606 (as amended on October 25, 2019) "On Measures to Implement the Demographic Policy of the Russian Federation", <http://www.pravo.gov.ru>
  9. S.E. Bebinov, O.N. Krivoshchekova. Federal State Budgetary Educational Institution of Higher Vocational Education SibADI, (2016) <https://www.elibrary.ru/>
  10. R.M. Nureyev, A. Inshakova, V. Sorokozherdieva, *Strategies for the modernization of Russia: problems of formation of the rule of law and an effective innovative economy* (2012)
  11. L.N. Safiullin, A.F. Mingazova, *Kazan Economic Bulletin*, **1(39)**, 71(2019)