

## STUDIES REGARDING THE IMPORTANT FEATURES OF AN ATHLETE'S DIET IN DIFFERENT SPORTS BRANCHES

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### Abstract

*This work presents the particularities of the diet in some sporting branches depending on the nature of the effort, the organs requested, the climatic conditions etc. Taking into account these criteria, the amount of nutritious substances found in food are established, in order to satisfy the average energetical consumption of a sportsman weighing around 70 kg who practices a certain sport. To help the body recover after exercise sportive must facilitate detoxification and the body's water intake must be maintained at constant limits. The research method presented is based on bibliographic study and experimental methods in order to determine the nutritional values needed for a consistent diet. The sports performances obtained worldwide have reached values that years ago seemed inconceivable. For their achievement, the athletes are subjected to a complex training process, in which the effort often requires the body to exceed its maximum physiological limits.*

**Key words:** food, nutrients, sports branches.

### INTRODUCTION

In sports, a template of eating is not recommended since it does not reach its target and it is sometimes damaging. To meet the requirements and in order to stay close to these sports activity for as long as possible, it must combine the training process with the observance of the sports life regime, in which the correct nutrition has a primordial role. Hence, an individualisation of the eating pattern is required which needs to be made according to a group of sportsmen or sometimes depending on only one sportsman taking into account the age, weight, branch of sport. Respecting the life and food regime, both in preparatory stages and especially in the competitive ones, it represents a basic factor that conditions the preparation of the organism at an optimal level and consequently obtaining superior performances. The well-defined substances from a chemical point of view and indispensable to humans are: proteins, lipids, carbohydrates, mineral salts, vitamins and water. From the point of view of the role they

play in the body, they are divided into two groups: energetic or caloric and protective or maintenance. The basic substances found in food (proteins, lipids, carbohydrates) have different roles in the body and aid only certain types of effort (Barbuica, 2015). To help the body recover after exercise sportive must facilitate detoxification. Body's water balance must be maintained at constant limits. After the competition when in blood circulating, metabolite results from the effort required a greater amount of water to eliminate. Vegetables and fruits are part of the group that includes all foods of vegetal origin containing lot of water. Vegetables and fruits are a source of vitamin C. The role of vitamin C in the body is very important. It is involved in cellular respiration stimulating redox processes. Enhances the antitoxic action of the liver and increases the overall resistance of the organism. For this reason, sport activity vitamin C should not only be used sporadically or before the start but systematically throughout the training and competitions. During sport activities the need for Vitamin C reaches an average of 150-200

mg per 24 hours, while during the competition stage may reach 300-400 mg per 24 hours (even up to 500 mg per 24 hours on authors opinion).

## MATERIALS AND METHODS

The study regarding the particularities of the sportsman's diet in different sports branches was made using the bibliographic study approach and the experimental method which requires groups of 5 sportsmen from the following branches: athletics, volleyball, basketball, handball, football, rugby and tennis. (Barbuica, 2015)

## RESULTS AND DISCUSSIONS

Vegetables and fruits are the most important source of carotene (provitamin A). Highest in carotene content belongs to: leafy greens, carrots, beets, tomatoes, radishes, cherries, peaches. Vegetables and fruits, in addition to their high vitamin content, also contain minerals. As food predominating alkaline miliequivalents providers they are indispensable for ensuring the acid-base balance of the ration for athletes. Fruit and vegetables are also a source of carbohydrates which, along with vitamins, increase glycogen reserves in liver and improve its functional status.

Vitamins are part of the substances which have an enzymatic role, ferments which aid different chemical reactions, especially the oxidation-reduction ones, acting as catalysts. (Rosoiu, 2003) The minerals are part of all the nutritious substances with a plastic (calcium, phosphorus, potassium and iron salts) and catalytic role (copper, iodine, cobalt, iron salts). They are necessary to the organism in order to maintain its good health and improve the quality of life.

Different types of food used in a sportman's diet as well as the amount of vitamins and minerals can be found in Table 1 (Craciun, 1996).

Athletics is a sport which contains multiple tryouts. Because of this, the food intake needs to be set based on the types of tryouts which have similar features (Banu, 2005).

a) Short distance running, jumping, throwing  
Short-term effort with a maximum intensity, emphasising on the reaction speed. The caloric value of the ration reaches 4400-4600 calories in 24 hours and it will be composed of the following nutritious substances:

- Proteins: 170-180 g (60% from animal origin)
- Lipids: 110-120 g (70% from animal origin)
- Carbohydrates: 650-700 g
- Calcium salts (1.8 g), phosphorus salts (3.5 g), potassium salts (3 g)
- Vitamins: B<sub>1</sub> (5 mg) and C (200 mg)

The types of food preferred are: milk, cheese, meat, oatmeal, vegetables (carrots, onion, tomatoes).

b) Middle-distance running

The physical effort is consistent and over a long period of time, with various types of rhythm, emphasising on the resistance based on speed. The caloric value of the ration reaches 4500-5000 calories in 24 hours and it will be composed of the following nutritious substances:

- Proteins: 130-140 g (60% from animal origin)
- Lipids: 130-140 g (70% from animal origin)
- Carbohydrates: 700-750 g
- Vitamins: B<sub>1</sub> (5 mg) and C (30 mg)
- Mineral salts: sodium chloride (10-15 g), calcium (1.5 g), phosphorus (3 g), potassium (3 mg)

The types of food preferred are: milk, cheese, meat, oatmeal, vegetables (carrots, onion, tomatoes).

It is known that although the living matter of the organism seems unchanged, in reality, due to the permanent transformations that underlie life, it is continuously renewed on the basis of substances brought through food.

The metabolism of sports effort shows more important changes depending on the nature of the effort made in different sports, intensity, duration etc.

Table 1. The amount of vitamins and minerals found in different foods for 100 g of product used in a sportsman's diet

Food	Carotene (UI)	Vit. B1 (UI)	Vit. A (UI)	Vit. D (UI)	Vit. K (UI)	Na (UI)	Ca (UI)	Fe (UI)	P (UI)
Cow milk	35	45	150	3-4	160	50	125	0,05	90
Cow Cheese	20	30	50	-	120	30	250	0,5	180
Cottage cheese	0	50	1200	20-40	150	2	500	0,6	400
Rice	30	40	-	-	200	30	15	0,5	150
Pasta	60	120	-	-	140	100	22	1,6	110
Beans	100	700	-	-	1500	60	110	6	400
Peas	150	600	-	-	1000	35	80	5	300

### c) Long-distance running

The effort has a medium intensity, but it over a very long period of time. The caloric value of the ration reaches 5500-6000 calories in 24 hours and it will be composed of the following nutritious substances:

- Proteins: 150-160 g (60% from animal origin)
- Lipids: 130-140 g (70% from animal origin)
- Carbohydrates: 750-800 g
- Vitamins: B<sub>1</sub> (5-10 mg) and C (300-400 mg)
- Mineral salts: sodium chloride (20-25 g), calcium (1.5 g), potassium (3.5 mg).

Besides the normal food ration, some food intake is required on the track as well. The products recommended are: sweetened fruit juice (such as lemon, orange, grape), oatmeal concentrates with sugar, salts and vitamins: salted liquid glucose with vitamins, cocoa, sweet and weakened coffee. Tablets containing glucose and vitamin C can also be given to the athletes (Rosoiu, 2003).

Metabolism is the transformation that takes place in living cells based on nutrients when the energy needed for these processes and the development of biological phenomena take place. Metabolism comprises two phases: anabolism and catabolism. Anabolism is the phenomenon of assimilation of nutrients from food and their incorporation in the forms of the human body. Catabolism is the phase of dissimilation and degradation of assimilated substances. The qualitative and quantitative balance of metabolism represents nutrition. It consists of all the phenomena that occur in the body after digestion and absorption of food in the intestine. In order to be useful to the body, food is subjected to transformations, some outside the body and others inside it. Through the digestion process that takes place in the

digestive tract, food is broken down under the action of various digestive ferments, first in the substances that are formed (proteins, lipids, carbohydrates, salts, etc.). They are further broken down into simple elements that are absorbed in the intestinal mucosa. After absorption the nutrients pass into circulation and reach the cells where they are metabolized. Since sports effort is achieved mainly with the help of muscles, muscle metabolism must be perfectly adapted to the body's effort, which can be achieved through methodical training, with numerous repetitions of movements in order to form stereotypes.

When it comes to water, after exercise it is not enough just managing salty water but we will add potassium for the diuretic effect. Detoxification can be achieved through a ration with a sufficient intake of water, sodium chloride, potassium chloride, alkaline salts and vitamins, especially B<sub>1</sub> and B<sub>6</sub> a moderate percentage of lipids and carbohydrates, but low in protein. It should be administered 24 hours after the competition. Hypoglycemia resulting from an intense and prolonged effort is accompanied by a decrease in plasma potassium. It is therefore recommended that after an exhausting effort to administrate to the athletes are both carbohydrates and potassium. Carbohydrates needed in the sportive body should be provided at a rate of 65-70% polysaccharides (starch), which gradually digest and does not cause hyperglycemia and only in proportion of 30-35% of mono and disaccharide (glucose, fructose, lactose, sucrose, etc.). Vegetal foods also contain an important polysaccharide called cellulose. This accelerates the intestinal transit in large amounts shorten the time of action of enzymes

on food and absorption during trophies. The amount of cellulose used needs to be higher in the preparatory stages and recovery stages. In competitive stage cellulose intake must be smaller in order to not disturb the digestion. After the competition, the athlete loses a small amount of its reserves of fat. For that ratio to remain balanced and still respect the relationships between foods he can eat: butter, pasta or rice and oil in salads. For recovering of the potassium amount it is recommended the consumption of dried fruit at dinner. Other minerals (magnesium, calcium, iron, etc.) suffer certain changes, but losses may not be compensated immediately.

Carbohydrates reserve should be recovered avoiding massive ingestion of sugars. There are enough carbohydrates ingested at dinner table in form of pasta, rice, potatoes, fruit or fruit juice.

Meat in general and liver in particular have a strong erythropoietic action because these foods contain essential amino acids. Due to the abundance of lysine, meat stimulates the growth process in general, especially muscle growth. Given their nutritional value and mainly their class I protein content, much needed during effort in sports, it is recommended that athletes consume a certain amount of meat or fish per day, especially during speed and strength exercises.

### **Sports games** (volleyball, basketball, handball, football, rugby)

When it comes to sports games, the effort is of a high intensity and it requires speed, strength, resistance and skills. The caloric value of the ration reaches 4500-5000 calories in 24 hours and it will be composed of the following nutritious substances:

- Proteins: 170-180 g (60% from animal origin)
- Lipids: 120-130 g (70% from animal origin)
- Carbohydrates: 650-700 g
- Vitamins: B<sub>1</sub> (3-5 mg) and C (300-400 mg)
- Mineral salts: calcium (2-2.5 g), phosphorus (4-5 g).

A large consumption of fruits and vegetables is required, which besides carbohydrates, contain mineral salts as well as vitamins. The amounts of pasta and bread will be reduced and a

consumption of proteins is required, especially coming from an animal origin. These can be found in milk, cheese, meat, fish eggs etc.

Meat, fish and their derivatives along with milk and cheese are a good source of protein with high biological value (Class I proteins). Thus light meat, especially beef, contains 17 to 22% protides, while weak fish contains 15-20% protides. Their association with cereal products raise cereal product's nutritional value. Meat, fish and their derivatives contain significant amounts of minerals. Meat, especially the viscera (liver, kidney) is the richest source of iron. Meat and fish are rich in phosphorus, potassium and sodium but low in calcium. Meat is the most important source of vitamins PP, B<sub>2</sub> and B<sub>6</sub>, while fish is a source of vitamins A and D.

Vegetables and fruits are a source of vitamin C. The role of vitamin C in the body is very important. It is involved in cellular respiration stimulating redox processes. Enhances the antitoxic action of the liver and increases the overall resistance of the organism. For this reason, sport activity vitamin C should not only be used sporadically or before the start but systematically throughout the training and competitions.

Vegetables and fruits are the most important source of carotene (provitamin A). Highest in carotene content belongs to: leafy greens, carrots, beets, tomatoes, radishes, cherries, peaches. Vegetables and fruits, in addition to their high vitamin content, also contain minerals. As food predominating alkaline miliequivalents providers they are indispensable for ensuring the acid-base balance of the ration for athletes. Fruit and vegetables are also a source of carbohydrates which, along with vitamins, increase glycogen reserves in liver and improve its functional status.

The amount of food with composes the ration is determined by the composition of the products as well as the caloric effect produced by 100 g of food. Hence, carbohydrates, lipids and mineral salts are essential. In Table 2 (Alexandrescu, 1994) different products which are part of the sportsman's ration are presented.

Table 2. Types of food which are part of the sportman's food ration (proteins, lipids, carbohydrates and their respective calories)

Food	Amount/week	Proteins	Lipids	Carbohydrates	Calories
Cow milk	7 days x 300 g	70	70	96	1350
Cow Cheese	3 days x 100 g	42	4	12	265
Cottage cheese	3 days x 50 g	35	38	-	483
Rice	4 days x 50 g	8	2	135	635
Pasta	4 days x 50 g	26	2	252	776
Peas	4 days x 50 g	10	31	324	1275

Dishes of meat and fish make up sources of vitamins of equal importance as foods originating from. Meat and fish are also a source of energy according to their fat content. The living organism needs food in order to cover energy costs. This energy is expressed by high calories. Depending on the energy requirements of the body we can talk about basal metabolism (basic) and effort metabolism (professional and sport). Diet dominated by meat has the advantage that it allows muscle to increase their volume and strength. Animal proteins stimulate the nervous activity and facilitate the transmission of nerve excitations which consequently help to increase effort capacity especially in the speed contests. In high intensity effort sports (running, throwing, sports games) and in those in which force prevails by imposing a large muscle development (weightlifting, wrestling) 2.3-2.5 g protein per kg of body weight per 24 hours are required. Of these 60% must be of animal origin and 40% of vegetable origin.

It was established that in different sports branches the ideal calorie intake is approx. 5500 calories for 24 hours. In Table 3, the necessity of energetical substances is presented for a 5000 calorie intake over 24 hours as well as their variation in Figure 1.

Given their nutritional value and especially their Class I protein content (necessary during the effort), it is recommended that athletes consume at least 250-300 grams of meat or fish per day especially on speed and strength efforts.

Meat is recommended to be administered on meals before special effort. In the evening meat consumption should be reduced because it can adversely affect the sleep. Meat derivatives and canned fish are more nutritious, have a high caloric value, but are harder to be digested.

Consuming of large amounts of meat derivatives and canned fish determine the change in internal pH to acidic, which is unfavorable for sport activities, especially after the finish of exercises.

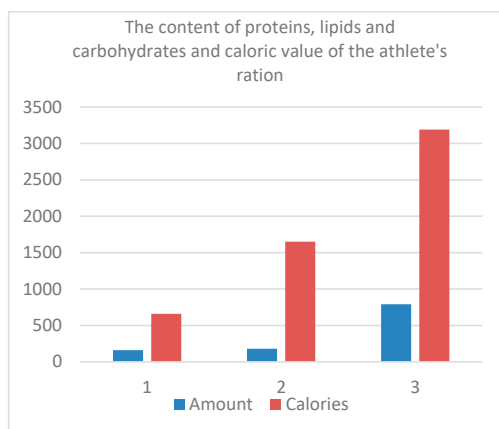


Figure 1. The content of proteins, lipids and carbohydrates and their caloric value present in a sportsman's food ration

Table 3. The required energetical substances in grams for a 5500 calorie intake over 24 hours

12% Proteins	Calories	Grams (g)	Animals origin: 60% = 96 g
	660	160	Plant origin: 40% = 64 g
30% Lipids	1650	180	Animals origin: 70% = 126 g
			Origine vegetala: 30% = 54 g
60% Carbohydrates	3190	790	Polysaccharides: 65% = 514 g
			Mono and disaccharides 35% = 276 g

Considering vitamin C, this dose must not be exceeded as it may cause various undesirable side effects including sleep, excitement, muscle

cramps. In case of hypovitaminosis C muscle fatigue may occur. This happens more often in winter and spring due to lack of fresh vegetables in the diet. Vegetables and fruits should provide 15% of the caloric value of the ration (Rosoiu & Serban, 2003). If this percentage is not reached it is desirable to provide a supplement of Vitamin C to athletes as juices. In some studies a correlation between vitamins is required as an excess of one vitamin may influence the effect of another. For example, provitamin A in excess leads to hypovitaminosis C.

## CONCLUSIONS

All the vital processes as well as the other human activities are carried out on the basis of an energetic consumption and by incorporating the nutrients. The elements that cover these needs are found in the environment and it is called external food or simply food.

1. In sports practice, it is required for the food intake to be made considering different groups of sportsmen and the following criteria: age, weight and sports branch.
2. Proteins, lipids and carbohydrates have different roles in the organism, supporting different features and types of physical effort.
3. The food intake needs to be organized, taking into account the features of metabolic processes in different tryouts and they are

determined by the features of the exchange of substances and the intensity of the physical effort. In the rationed food intake of sportsmen the most reliable correlation is the one between proteins and lipids.

4. A large consumption of fruits and vegetables is required, which besides carbohydrates, contain mineral salts as well as vitamins.

5. Detoxification can be achieved through a ration with a sufficient intake of water, sodium chloride, potassium chloride, alkaline salts and vitamins, especially B<sub>1</sub> and B<sub>6</sub> a moderate percentage of lipids and carbohydrates, but low in protein.

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