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# FOOD MARKERS OF THE CANINE NUTRITION SYSTEM

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***Abstract***
*The markers of the canine nutrition system represent a very important aspect in choosing a proper diet for the animal. They are distinguished by the use of age, waist, and physiological condition as determinants in the diet of a dog. It is also necessary to know the nutritional value and the components of each type of food to achieve the biological needs of each organism, depending on the individual representative medical needs. For a healthy body, depending on the needs, a balanced diet should consist of a source of protein with a high nutritional value and a small amount of carbohydrates that will lead to proper nutrition, without the presence of food allergies. Increased attention is paid to the nutrition of dogs, and seniors, over the age of 9, where the appearance of various diseases is observed with advancing age (heart disease, lung disease, liver, and kidney dysfunction) trying to avoid large amounts of fats and the use of foods low in sodium, potassium, and phosphorus that can attack the already weakened liver and kidneys. The purpose of writing this article is to review nutritional markers and analyze the nutritional components of diets, depending on various factors.*

*Keywords: Allergies, Intolerance, Nutrition, Type of food, Variety*

## 1. INTRODUCTION

Over the years, animal husbandry has been transformed from a need to survive into a desire to care for and love these creatures. Thus, the responsibilities of people to constantly monitor their health have increased.

If we are talking about dog care, a very important aspect that needs to be evaluated is the choice of the type of food. If in the beginning a dog's food was made up of 80% meat, later it was wanted to replace with various elements, which proved not to be very beneficial for an animal's body.

Choosing the right nutrition system for your dog can be a daunting task. It is very important to have information about the animal so that it can analyze its feeding behavior and specific nutritional needs and provide all the vitamins and nutrients it needs for a healthy body (Hiney et al., 2021).

Several markers underlie the nutrition system, and characteristics of dogs: variety, type of food, protein quality, the relationship between canine nutrition and carbohydrates, protein quality, and nutrition characteristics depending on the age of the dog (Animal Media, 2022).

## 2. THE BASIC CRITERIA IN THE CORRECT CHOICE OF DOG FOOD

An important aspect is the *variety*. Each of the dishes on the market has a differentiating factor, designed to arouse interest and motivate the choice. Canine feeding problems are as delicate as human nutrition, with dogs having similar feeding and nutrition needs. To always make the right feeding choice for a dog, the following criteria are considered (Manolescu, 2000):


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*1. Breed*: influences the mode of feeding and the type of food administered. Some breeds may be prone to certain diseases and therefore need special diets. Thus, some breeds may be prone to obesity or dermatological problems - they have certain sensitive points (joints in large dogs, digestion in English Bulldogs, spine in Dachshunds).
Daily energy needs are different depending on race, due to constitution, temperament, and activity level. Terra Nova dogs, for example, have 15% lower energy needs than average, while German Dogs and Dalmatians have increased needs by more than 16% above average).
*2. Activity level*. The food must be adapted to maintain optimal body weight. The needs of a sedentary dog are different from those of an active dog (Calabrò et al., 2013).
. If we have a dog that lives in a block of flats and is taken out 2-3 times a day for 15 minutes, we will approach the feeding system differently from an active dog, such as those working - racing greyhounds, hunting dogs, herding dogs, dogs for driving the blind. Show dogs have a special place, whose performance is determined by genetics, health, socialization, training, and proper nutrition (Feng, et al., 2014).
*3. The environment.* It significantly influences energy requirements. Temperature, humidity, shelter, stress, and acclimatization must be taken into account when calculating daily energy requirements. If a dog is kept outside, its energy needs can increase by 10 to 90%, depending on the temperature. Temperature losses are minimal at low critical temperatures (the temperature at which minimal metabolic reactions can occur), (Hills, 2019).
The critical temperature is specific to each breed and is about 15-20 degrees C for long-haired breeds and 20-25 degrees C for short-haired breeds. For Nordic breeds, the temperature can be as low as 10-15 degrees.
*4. Allergies or intolerance*. Several breeds are exposed to allergies due to their eating habits: Spanish Cockers, Dalmatians, Labradorians, and Dwarf Schnauzers. For these delicate cases, it is important to have information about the particular needs, the ingredients, and the way the animal feels, moves, and looks (Pion, et al., 1998).
*5. Size.* Small dogs have higher energy needs than large ones and are generally very demanding, so their food must be adapted to the size of the oral cavity. The shape of the croquettes must respect the grip of the food and the force of the bite (Sanderson, 2016).
Medium-sized dogs need an assortment that will help them maintain an optimal weight, with a high degree of digestibility, with a balanced ratio of fiber to control intestinal transit. The size of the berries must be optimal for the waist.
Large dogs also need the right size of berries, because too small a food causes gastrointestinal problems, as it will be swallowed without chewing.

## 3. DISCUSSIONS RELATED TO ESTABLISHING THE TYPE OF FOOD ACCORDING TO PROTEIN QUALITY AND THE BIOLOGICAL VALUE OF NUTRIENTS

### *Type of dry/wet dog food*

Semi-moist food is generally not recommended, as it is high in salt and sugar. Dogs do not need large amounts of sugar or salt for a healthy diet. For *large dogs*, dry food is best. *Giant and large dogs* need a larger amount of food than small ones, and dry food is easy to transport, store and prepare. Preserved foods contain a much higher percentage of water (80-85%) compared to 10%, the representative percentage for dry food. Dry food requires care for the optimal hydration of the dog. If the animal refuses to drink water in the suggested and essential amounts, wet food might be a helpful source of hydration.


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Wet food may be an advantageous option for you due to several health factors. Senior dogs that have lost their sense of smell could be drawn to a dish with more flavor and aroma, which is frequently the case with canned food. In cases of illness, recuperation, or loss of appetite, wet food is also advised.

Wet food will ensure optimal levels of protein, vitamins, and minerals, including for *dogs with missing teeth, off-center jaws, or small mouths*. Wet food also has some disadvantages: the shelf life is very limited and the storage conditions are demanding (Manolescu, Balint, 2009).

The issue of costs is another criterion that makes wet food a delicate choice. Dry food is the most convenient choice, if we consider the quality and price ratio, storage conditions, validity, and ease of use. Dry food can also be used as a reward for training and as a supplement for healthy teeth development. Some dry foods have special formulas that help clean your teeth while chewing. However, this type of food does not provide the level of hydration we find in canned foods (Kölle, Schmidt, 2015).

Another positive feature of dry food is that it benefits from greater diversity and approach when it comes to vitamins, nutrients, and particular eating habits (Smith, Parnel, 2021).

The six basic nutrients are:

- the water;
- protein;
- fats;
- carbohydrates;
- minerals;
- vitamins.

***The relationship between canine nutrition and carbohydrates***

The level of carbohydrates in a healthy dog diet should be *zero* (Cowell et al.,2008). The International Research Council has concluded that a dog does not need any carbohydrates in its diet. Dogs don't need corn, rice, potatoes, barley. However, carbohydrates are the dominant ingredient in most dry foods. As basic features, carbohydrates are:

- present in abundance;
- an essential ingredient for dry food;
- accessible.

Carbohydrates are not particularly harmful to dogs in reasonable quantities. They provide a high level of energy (Gizzarelli et al., 2021).

When it comes to carbohydrates, the real issue is *quantity*. Today's dogs consume 14% more carbohydrates than they were used to in the wild throughout history. Today, dog food contains somewhere between 46 and 47% carbohydrates. Dog food now contains four times more carbohydrates than old feed products (Hills, 2019).

It is very important to pay attention to the amount and percentage of carbohydrates present in the diet of the quadruped. For it to be of the highest quality, it needs to be rich in animal protein (Pezzali, Aldrich, 2019).

The percentage of meat or animal protein must be higher than the amount of carbohydrates. If the first ingredient is cereal, it means that it is present in a larger amount than meat.

Cereals are a source of carbohydrates and provide a feeling of satiety, but have a much lower nutritional value than meat and fat (Steven, 2020).

Some scientific research has shown that cereals are the main allergenic factor in dog food (Carciofi et al., 2008).


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***Protein Quality***

Feathers, hooves, beaks - all these contain protein in very large quantities but are the most harmful protein for the dog, because, for him, it is almost impossible to digest (Lee, Prosky, 2020). The amount of protein present in a certain type of food can be increased, which does not mean that the protein present is beneficial. The *nutritional value* of the protein is essential (Hall et al., 2016).

*Biological value* is a scientific method of comparing nutritional quality between different ingredients. For a protein to be of optimal quality, it must be rich in the ten essential amino acids for successful nutrition. The higher the biological value of the protein, the more suitable it is for the animal's diet (Militaru, 2004).

*Chicken egg* is the main benchmark after which the rest of the proteins are appreciated. The biological value of the hen's egg (corresponding to the optimal value) is 100.

In conclusion, for the protein present in canine food to be beneficial, it must not come from bones, beaks, or hooves and must have an increased biological value. Following the analysis of new cases studied, we reached the following result - see *Table 1* and *Table 2.*

***Table 1. Table of biological values of high protein nutrients***

| Nutrient type | Growth and reproduction | Minimum permissible limit/adult | Maximum permissible limit/adult |
|---|---|---|---|
| Crude protein | 21% | 17% | |
| Crude fat | 9% | 6% | |
| Linoleic acid | 1.01% | 1.01% | |
| Calcium | 0,9% | 0.7% | 2.55% |
| Phosphorus | 0.9% | 0.6% | 1.66% |
| Potassium | 0.5% | 0.7% | |
| Sodium | 0.4% | 0.05% | |
| Copper | 7.4 mg/kg | 7.2 mg/kg | 260mg/kg |
| Zinc | 119 mg/kg | 121 mg/kg | 1.000 mg/kg |

***Table 2. Table of biological nutrient values compared to that of chicken egg***

| Ingredient | Biological value |
|---|---|
| Eggs | 105 |
| Fish food | 93 |
| Beef | 77 |
| Milk | 76 |
| Wheat | 59 |
| Maize | 53 |
| Wheat gluten | 39 |

*Source of Table 1 and Table 2:* The collection and processing of the data in the table belongs to us.

## 4. CONCLUSIONS

We present in the following the essential conclusions about the characteristics of the dog's age.


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The dog's life is made up of three stages, natural and symmetrical with those of human existence. Dogs can therefore be *juniors, adults, or seniors*. Each stage of canine age must be approached differently, depending on specific nutritional needs.

*Junior age*

A puppy must stay with its mother until the age of eight weeks. Dogs that are deprived of their mother's care earlier than this threshold are prone to disease, have a weakened immune system, and may have vitamin and mineral deficiencies in the body. The puppy must benefit from the nutritional qualities of *breast milk*, which is extremely important for *strengthening the immune system* and for *the transfer of antibodies.*

*At the age of four weeks*, in addition to breast milk, the gradual integration of puppy feed is recommended. *The starter formula* is the most suitable because it offers a composition similar to that of breast milk and is delicate with the still undeveloped teeth of the chicken.

Until the teeth are fully developed, the chick will need to be taught to eat. If there are difficulties in assimilating dry food, then it is recommended to soak it in powdered milk for puppies, until it turns into a paste.

At the age of four weeks, one meal of dry starter food per day is sufficient. Milk will continue to provide her with age-specific nutritional needs.

Dry starter food is the first step towards a complete transition to dry nutrition, the chicken getting used to the berries. As he advances to the age of *eight weeks, when the chick is usually weaned*, dry feeding and feeding with specific dry food should no longer be a problem for him. Nutrition at this age is essential because, in addition to the maintenance diet, nutrients are needed to ensure:

-weight gain;

-increase muscle mass;

-growth and consistency of the skeletal system and joints.

A harmonious growth due to a proper nutrition system must have the effect in a few months of building a solid bone system and adequate muscle mass; it involves a balanced diet, with a high degree of digestibility and high biological value, rich in protein, vitamins, and minerals.

The age of *eight weeks* is a very important one. We need to choose a *super premium quality food* with a high percentage of protein and low cereal content. The caloric level must be high and the food must be very easy to digest and contain an optimal ratio of calcium and phosphorus specific to age. For large and giant dogs, it is essential that at a young age, the food has a high content of chondroitin and glucosamine, to strengthen and support the joints.

The size of the berries *for juniors* must be adapted to their age. A junior dog cannot eat very large berries and may not eat the chosen food for this reason.

From the age of *three months*, it is possible to switch to two meals a day, respecting the daily amount recommended by the manufacturer of the respective brand.

*Adulthood*

This stage is different depending on the size of the dog:

-*small* dogs (those that do not exceed 10 kg in adulthood), reach adulthood after the first year;

-*medium* dogs (those that do not exceed 25 kg in adulthood), reach adulthood after 12-16 months, depending on the breed;

-*large and giant* dogs (at maturity exceeding 25 kg), mature around the age of 18 months or even two years.

Until the completion of each age cycle of the first stage, depending on the breed of the dog, it is important to provide specific food to the juniors. The transition from one type of food to another is gradual, to allow the intestinal bacterial flora to adapt slowly to the new assortment of food.


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For 10-14 days, it is very important for the quadruped to receive a mix of the two types of food: on the first day, 90% of the junior food and 10% of the adult food; The percentage of new food will gradually increase by 10% every day. This will prevent gastrointestinal problems, and the dog will become more accustomed to the new type of food. After two weeks, the dog will consume only the adult food that covers all his nutritional needs and keeps him in an ideal physical shape.

*The adult dog* needs a balanced and complete diet, which maintains its health and activity at an optimal level, so an adult specimen needs food with an optimal intake of protein, to maintain muscle mass, at a caloric level. sufficient for its activity, as well as an optimal ratio between vitamins and minerals. Thus, his bone and joint system will not suffer.

Particular attention will be paid to maintaining the weight of the dog, in the first phase of the transition to adulthood being exposed to obesity. Therefore, inadequate foods high in cereals or fats should be avoided.

Improper nutrition over time leads to other health problems: diabetes, joint problems, etc.

Prohibited foods in dog food: chocolate, candy or very sweet products, grapes, and raisins, Xylitol, high-fat or very salty foods, leftovers from human meals, chicken or pork bones, onions, onion paste or garlic, food spoiled, the seeds of some fruits.

Xylitol is an artificial sweetener, which is found in several foods such as chewing gum, candy, sugar-free cookies, juices, etc. Once in the dog's body, it causes an increased secretion of insulin, which in some cases can induce hypoglycemic coma, by dramatically lowering blood glucose. Xylitol also affects liver function, with severe effects in more sensitive individuals. Signs of xylitol poisoning are:

-vomiting;
-diarrhea;
-uncoordinated walking;
-inability to stand (ataxia);
-limb tremors, convulsions.

*Senior age*

Dogs age much faster than humans, but with regular visits to the vet, proper food, and care, the elderly dog *can* live many healthy years.

*Large breed* dogs are considered old after six or seven years, while *small breeds are* more difficult to age after they are ten years old.

The best way to tell if a dog has aged is to look at his behavior and appearance:

-older dogs are prone to tooth and gum problems - as a result of these conditions, the dog will lose food from his mouth when he feeds or even refuses food;
-other health problems associated with aging are heart problems, indicated by coughing, difficulty breathing, and rapid onset of fatigue;
-concerning the eyes, blurred vision is quite common in dogs, but care must be taken with the appearance of cataracts which can lead to blindness in the animal.

As with humans, *dogs' metabolism slows down as they age*. Because older dogs are not as active as before, there is a tendency for quadrupeds to gain weight. We can check if a dog is too fat or too weak by touching its ribs:

-at a normal weight, the ribs will feel discreet under the skin;
-the thicker the "layer" that covers them, the fatter the dog.

*The level of calories* in dog food is not as high as in the early years when the animal needs as much *fiber and protein as possible in its old age*. It is recommended that we offer older dogs a *low-fat diet.*


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*Rapid weight loss* should be of concern to us, as it can be a sign of illness. A healthy diet is very important for the old dog, and it can differ from breed to breed, depending on his nutritional needs. In most cases, the *diet of older dogs is poorer in protein, sodium, and phosphorus so as not to attack their already fragile heart and kidneys.*

*Obesity* in dogs is a common problem, which leads to a shortening of their lives by reducing, among other things, the heart's ability to cope with the effort, as well as many other health problems.

Poor nutrition can lead to terrible problems like allergies, malnutrition, skin and fur issues, and obesity.

Nutrition problems occur in any breed of dog and at any age. Increased attention should be paid to allergy risks. Various types of meat, cereals, dairy products, artificial additives, colors, flavor enhancers, and preservatives can cause allergies in dogs. Dogs with allergies frequently experience skin issues like rashes, persistent itching, or infected skin patches. After being exposed to protein and carbohydrate sources for a prolonged period, many of them develop sensitivities to them.

It can be sufficient to switch up the sources of protein and carbohydrates to stop allergic reactions. The majority of dogs develop obesity rather than malnutrition, however, a dog on a low-nutrient diet can begin to experience malnutrition. *Malnutrition is caused by an incomplete, unbalanced, or limited diet (eg only meat).* On the other side, *renal disease* can be exacerbated by eating *too much protein*.

If their food contains a lot of calcium while they are young, some dogs, especially enormous and giant breeds, may experience problems with their bones' health.

To prevent hypoglycemia, *small juniors* need to eat a lot of *nutrient-rich foods*. Cancer may be exacerbated by a deficiency in antioxidants such as *vitamins E and C*.

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