

## IMPORTANCE OF VARIOUS NUTRIENTS IN A DOG'S DIET

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### ABSTRACT

Dogs require a balanced and nutritious diet containing a variety of essential nutrients for their overall health. Proper nutrition is crucial for growth, vitality, and well-being, while inadequate nutrition can lead to health issues. A balanced diet should include proteins, carbohydrates, fats, vitamins, and minerals, provided in appropriate quantities. Carbohydrates serve as an energy source, supporting digestion and brain function, while proteins are essential for muscle repair, immune support, and energy. Fats provide concentrated energy, assist in vitamin absorption, and promote cellular health. Understanding the roles of these nutrients is vital for meeting dogs' dietary needs effectively. Vitamins, minerals, and water are essential nutrients for dogs, supporting various biological functions. Important vitamins include A (immune health, eyesight), B complex (energy metabolism), C (antioxidant), D (calcium and phosphorus balance), E (cell protection), and K (blood clotting). Essential minerals consist of macrominerals like calcium, phosphorus, magnesium, potassium, sodium, chloride, and sulfur, along with microminerals like iron, zinc, copper, manganese, iodine, and selenium. These minerals contribute to bone health, muscle function, electrolyte balance, oxygen transport, skin and coat health, hormonal regulation, and antioxidant protection. Water, comprising 70-80% of a dog's body mass, facilitates digestion, temperature regulation, waste elimination, lubrication, and cellular function.

**Keywords:** Digestion, Dog, Health, Nutrients, Temperature

### Introduction

Just like humans, dogs require a balanced and nutritious diet to lead a healthy and happy life. Proper nutrition is essential for their physical nourishment, maintaining vitality, growth, and overall well-being. Simply feeding dogs or providing them with food does not constitute a balanced diet; rather, it involves ensuring that they receive the appropriate quantities of essential nutrients. A balanced diet can boost a dog's energy levels, result in a shiny coat, improve digestive efficiency, and help strengthen their immune system. Conversely, inadequate nutrition can lead to various health issues, such as obesity, allergies, and digestive disorders. Educating oneself about nutritious diets can help in effectively meeting a dog's specific dietary requirements. When considering a balanced diet for dogs, it is crucial to plan in a way that ensures they receive all necessary nutrients in the correct proportions on a daily basis. Much like humans, dogs require a variety of nutrients to maintain good health. Dog requires nutrients such as proteins, carbohydrates, fats, vitamins, and minerals. To fully understand the importance of a balanced diet, it is essential to first understand the functions of all the various nutrients. Let us know the roles played by proteins, carbohydrates, fats, vitamins, and minerals within this nutritional framework.

**1. Carbohydrates:** These constitute a vital component of a balanced diet for dogs. Although carbohydrates may not be as strictly essential as proteins, they serve as an excellent source of both energy and fiber. Common sources of carbohydrates in canine diets include whole grains, vegetables, and fruits.

The significance of carbohydrates is outlined as follows:

1. Carbohydrates help maintain proper nutritional balance, optimize digestion, and ensure regular bowel movements.
2. Carbohydrates function to supply glucose a compound that is absolutely essential for the proper functioning of the brain and the central nervous system.
3. Energy is fundamental to sustaining life, and this energy is effectively supplied by carbohydrates.
4. Dogs are highly efficient at digesting carbohydrates and converting them into usable energy. Deriving energy solely from meat or fish proteins is a far more difficult process.
5. Extracting energy from meat/fish proteins takes longer and places a greater metabolic strain on the body; consequently, a "zero-carbohydrate" diet can indeed pose significant physiological challenges to the metabolism, potentially leading to various digestive system-related issues. However, the most critical factor to consider is the type of carbohydrates utilized in the diet, as well as how and in what proportions they are combined with proteins and fats.

Generally, carbohydrates are divided into four categories—starch, sugars, oligosaccharides, and fiber which our dogs' digestive systems process.

**Starch and Sugars:** Enzymes capable of digesting starch and sugars are produced in a dog's small intestine and pancreas, where they convert these substances into glucose. In addition to helping the brain and nervous system function properly, glucose serves as a vital energy source for both humans and animals, providing fuel to our body's cells. Glucose is subsequently absorbed from the dog's intestines, enters the bloodstream, and is

transported to the liver, where it is immediately converted into energy.

**Oligosaccharides:** These are prebiotic fibers that support the growth of probiotics beneficial bacteria found in the gut thereby helping to maintain optimal intestinal health and improve digestive efficiency in dogs.

**Fiber:** In a dog's digestive system, fiber is not broken down by enzymes; consequently, the body does not derive rapid energy from it. Fiber is broadly classified into two types: Soluble Fiber: This type of fiber is predominantly found in whole grains. Soluble fiber provides nutrients to the beneficial bacteria residing in the dog's colon, which, in turn, produce short-chain fatty acids. These fatty acids help eliminate waste products and disease-causing bacteria from the dog's digestive tract. Furthermore, these fatty acids nourish the cells within the colon and contribute to maintaining a healthy digestive system. Insoluble Fiber: This type of fiber is found in whole wheat, as well as in beans, cauliflower, nuts, and potatoes. Insoluble fiber acts as a natural laxative within the digestive system, thereby ensuring proper digestive function and facilitating regular bowel movements. Regardless of the specific type, all forms of fiber enhance metabolic activity in dogs. They help create a sense of satiety after eating, thereby aiding in the prevention of obesity and assisting in the maintenance of a healthy body weight.

**2. Protein:** A dog's diet must include protein since it contains important amino acids needed for tissue repair, muscle growth, and a robust immune system. It creates hormones and enzymes, promotes good skin and hair, and serves as a vital source of energy for dogs, particularly young, active, and elderly canines.

In a dog's diet, protein plays the following important functions:

**Building and Maintaining Muscles:** Protein supplies the amino acids required for the development and maintenance of cartilage,

ligaments, tendons, and muscles. For working or elderly dogs in particular, getting enough protein is crucial to preventing muscle loss.

**Support for the Immune System:** Proteins are necessary for the production of antibodies, which are vital for defending the body against diseases and infections.

**Skin and Coat Health:** A healthy, glossy, and robust coat depends on consuming the right amount of protein. Deficiency of protein results in dry skin, brittle, lifeless hair, and delayed wound healing.

**Energy Production:** Dogs are physiologically adapted to use protein as a primary, effective, and long-lasting source of energy, however they can also use carbohydrates.

**Development and Tissue healing:** Protein promotes general development and tissue healing, which is especially important for nursing puppies and pregnant dogs.

**Enzymatic and Hormonal Regulation:** Proteins function as hormones that operate as chemical messengers throughout the body and as enzymes that power metabolism.

**3.Fats:** A dog's diet must include fats since they are the main, concentrated energy source (they provide twice as much energy as protein or carbohydrates) and help absorb fat-soluble vitamins (A, D, E, and K). In a dog's diet, fats serve the following important purposes:

**Energy production:** For dogs that are active, employed, or live in cold climates, fats are the most concentrated energy source.

**Essential Fatty Acids (EFA):** They supply Omega-3 and Omega-6 fatty acids, which dogs need to obtain from their diet in order to promote brain development, skin health, and immune function.

**Cellular health:** In order to build cell membranes and maintain healthy nerve and tissue function throughout the body, fats are necessary.

**Vitamin absorption:** Vitamins A, D, E, and K, which are essential for blood coagulation, immunity, bone health, and vision, must be absorbed through fat.

**Inflammation reduction:** Omega-3 fatty acids, such as those in fish oil, reduce

inflammation and are good for heart, joint, and arthritic health.

**Reproductive support:** Proper breeding performance and puppy development require a sufficient intake of fat.

**Palatability and Texture:** Fat makes food tasty and feels better, which entices dogs to consume.

**4. Vitamins:** Vitamins are vital organic substances that control vital biological functions in dogs, such as energy metabolism, immune system support, neuron function, and skin/coat health. A (vision), B (metabolism), D (calcium balance), E (antioxidant), and K (clotting) are important vitamins in dog nutrition.

**Important functions of the vitamins:**

**Vitamin A:** Vitamin A plays a vital role for immune system regulation, reproductive health, skin, and eyesight.

**The vitamin B complex:** which includes B1-thiamine, B2-riboflavin, B3-niacin, B5-pantothenic acid, B6-pyridoxine, and B12-cobalamin, is essential for cell function, energy control, and the metabolism of lipids, proteins, and carbohydrates.

**Vitamin C:** Although dogs can make some of their own, vitamin C functions as an antioxidant to lower inflammation and boost immunity.

**Vitamin D:** Controls calcium and phosphorus levels, which are necessary for the growth of muscles and strong bones.

**Vitamin E:** Preserves the health of the skin, muscles, and organs by shielding cells from oxidative damage.

**Vitamin K:** Essential for healthy blood coagulation.

**Choline:** Promotes healthy cell membranes and supports brain and liver function.

**5. Minerals:** Calcium, Phosphorus, Magnesium, Potassium, Sodium, Chloride, and Sulfur are the essential macrominerals and Iron, Zinc, Copper, Manganese, Iodine and Selenium are the essential microminerals in the dog diet. They play various important roles as follows in dog body.

**Structural support (bone & teeth):** The development and upkeep of strong bones and teeth depend on calcium, phosphorus, and magnesium in the diet.

**Muscle and nerve function:** Nerve transmission, muscle contractions, and relaxation all depend on magnesium and sodium content in the diet.

**Electrolytes and fluid balance:** Sodium, potassium, and chloride control blood pressure and cell hydration.

**Transportation of Oxygen:** The formation of hemoglobin, which transports oxygen throughout the body, depends on iron in the body.

**Skin, Coat, and Immunity:** Zinc boosts the health of the skin, coat, and immune system.

**Hormones and Metabolism:** Iodine promotes thyroid gland activity and metabolic rate.

**Antioxidant Protection:** Selenium reduces oxidative damage to cells in the body.

**Blood Coagulation:** Calcium is essential for normal blood coagulation.

**6. Water:** Water is the most crucial nutrient for dogs, making up 70–80% of their body mass, and is essential for different body functions. Water plays an important role in following functions.

**Digestion and Nutrient Absorption:** In the gastrointestinal tract, water acts as a solvent to break down food, which makes it easier for vital nutrients to be absorbed and transported throughout the body.

**Temperature Regulation:** Dogs rely on water to control body temperature through panting and heat transfer through the blood because they do not sweat like people do.

**Waste Elimination and Detoxification:** Water supports the function of the kidneys and liver by allowing the kidneys to filter out toxins and eliminate waste through urine and feces.

**Lubrication and Cushioning:** Water keeps tissues, cartilage, and joints healthy and serves as a cushion for the nervous system and essential organs.

**Cellular Function:** Water keeps body cells in their proper structure and is necessary for the body to be hydrated.

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