



# Assessment of feed safety and key factors for animal nutrition

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## DESCRIPTION

Animal nutrition primarily includes fundamental aspects of animal nutrition such as nutritional requirements, metabolic studies, body composition, energetics, immunology, neuroscience, microbiology, genetics, molecular and cellular biology. It covers the full range of animal nutrition science and reviews related to livestock nutrition and aquatic life. Although more applied aspects of animal nutrition, such as novel ingredients, feed additives, and assessment of feed safety are also be considered, it is expected that such research will be focused on nutrition.

Animal feed quality and safety are key factors to meet European Council (EU) domestic demand for safe high quality and healthy food of animal origin (eggs, milk, meat) and to take advantage of growing export opportunities. To ensure a reliable feed supply and improve the competitiveness of the livestock sector the EU feed sector is looking for new sources of ingredients such as by-products of the grain processing industry and turning them into high quality animals feeds. It is intended to be converted into high value animal food products. Animal nutrition science has proved its ability to contribute significantly to efficient nutrient livestock production, fostering the safety and dietary quality of animal products for human consumption, enhancing the animal health and

welfare status of farm animals and reducing greenhouse gas emissions and land use linked to livestock production on a unit product base (e.g., per litre of milk or kg of meat and eggs). Meeting the nutritional requirements of livestock is critical to maintaining acceptable performance in neonatal, growing, and breeding animals. From a practical point of view an optimal nutrition program ensures adequate intake of amino acids (both traditionally essential and nonessential), carbohydrates, fatty acids, minerals and vitamins by animals through supplementation programs that compensate for staple food deficiencies. (e.g., soybean meal-based diets), milk replacers for calves and lambs, available feeds for ruminants).

The nutritional requirements of most animals are relatively large and complex compared to the simple requirements of plants. Nutrients used by animals include carbohydrates, lipids, nucleic acids, proteins, minerals and vitamins.

Carbohydrates are the basic source of energy for all animals. Animals obtain carbohydrates from the external environment (compared to plants, which synthesize carbohydrates through photosynthesis). About half to two-thirds of the total calories consumed by each animal each day come from carbohydrates. Glucose is the most commonly used carbohydrate as an energy source. This monosaccharide is metabolized

during cellular respiration and part of the energy is used to synthesize Adenosine Triphosphate (ATP). Other beneficial carbohydrates are maltose, lactose, sucrose and starch.

Lipids are used to form the membranes of cells and organelles the sheaths that surround nerve fibers and certain hormones. Fat, a type of lipid, is a very useful energy source. Nucleic acids are used to build Deoxyribonucleic Acid (DNA), Ribonucleic Acid (RNA) and ATP. Animals obtain nucleic acids from plant and animal tissues, especially nucleated cells. During digestion, nucleic acids are broken down into nucleotides that are taken up by cells. Proteins form the skeleton of an animal's body. Proteins are essential components of the cytoplasm, membranes and organelles. It is also the main component of muscles, ligaments and tendons, and an essential substance for enzymes. Proteins are made up of 20 different amino acids. Many amino acids can be synthesized, but many others must be obtained from the diet. During digestion, proteins are broken down into individual amino acids and absorbed by the body. Minerals required by animals include phosphorus, sulfur, potassium, magnesium and

zinc. Animals normally obtain these minerals from plants. Vitamins are organic compounds that are essential to animal health. Vitamins are water soluble and fat soluble. Water-soluble vitamins need to be taken frequently, while fat-soluble vitamins are stored in fat droplets in the liver. Many essential vitamins include vitamin A for good eyesight, a substance used for cellular respiration (FAD, NAD, B vitamins for coenzyme A) and vitamin D, which helps the body absorb calcium.

Animals obtain nutrients through different feeding patterns. Sponges, for example, feed on small particles that get into their pores. Other aquatic organisms such as sea cucumbers, swing their tentacles around and trap food on their sticky surfaces. Mollusks such as clams and oysters feed by filtering substances through a layer of mucus in their gills. Certain arthropods feed exclusively on liquids. Some animals eat large amounts of food and usually have organs for grasping, chewing and consuming food.