Fundamental components of feed

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Intended Learning Outcomes

At the end of this week of study you should be able to:

- Describe the constituents of animal feeds, in order to explain their role in body processes and their importance in the diets of animals.
- Explain the methods and units used to measure feed constituents and dietary availability, in order to understand feed labelling and feed quality when recommending or formulating diets.

Keywords

Energy, protein, amino acids, fat, fibre, macronutrients, micronutrients, vitamins, measuring nutritional components

Introduction

An understanding of components that make up food is important as poor-nutrition can impact across a range of activities for an animal. Domesticated animals also have little dietary choice except what is offered by owners. Information labels on packaging are the most common advice owners get on dietary management but they can often be confusing and poorly explained. Terms such as energy, protein and fat content are used when describing foods but can be defined in several ways.

Energy

Energy is the fundamental unit that enabled bodily processes to occur. Its most simple form is ATP but is found in foods as a variety of compounds. We generally think of carbohydrate as energy but protein or lipid based compounds can be converted to drive metabolic processes. Energy in food has traditionally been measured as heat – the calorie, but the SI unit is the joule which is a unit of work. In order to compare feeds, these measures are often expressed as a number of calories or joules per unit weight of feed (e.g. J/kg or cal/100g).

Protein

Protein in feeds are important not so much as a form of energy but in the role protein plays in most other biological functions – growth, body support, enzyme production, immunity etc. Proteins consist of amino acid chains of varying compositions. Different animals have different protein and amino acid needs. Some amino acids can be converted into other forms but some cannot – these are termed "essential amino acids" that must be including in sufficient quantity in the diet. Certain amino acids are also known as "limiting amino acids". These essential and limiting amino acids differ from species to species.

Fat

Fat plays an important role in membranes, hormones, vitamin transport and energy storage within the body. Certain fatty acids can be essential in the same way as amino acids – that is they must be included in the diet.

Fibre

Fibre has important functions in feeds; it is a cheap source of energy and helps to maintain gut health and digesta flow. Different animals have different fibre needs depending on their natural diet.

Macro- and Micro-nutrients

Dietary components such as protein, fat and carbohydrate make up the majority of a diet and are often called macro-nutrients. Substances that are present in the diet in small quantities (such as minerals and vitamins) are known as micronutrients.

Measuring feed composition and availability to the animal

The composition of feed can be analysed in two ways, in vitro and in vivo. Both have advantages and disadvantages and the methods used relate to the end point that is required. For example, food labelling requires that the energy and protein content of a feed is given – this is determined usually by a lab-based in vitro method. However, that energy and protein may not all be available to the animal – its bioavailability may be lower.