

## **Protein quality assessment of food/diets with animal models**

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The quality of dietary proteins is based on the essential amino acid composition and digestibility. Quality estimates are necessary to determine the amount of a food/product required to provide a safe level of essential amino acids for growth and maintenance and also for monitoring changes in the nutritive value of proteins during food processing so that conditions that minimize quality loss can be adopted.

Protein quality is assayed using biological methods where animal models are used. Generally rats and mice are used as the animal models as monitoring compliance with dietary protocols is easier with animals than with humans. Compared to chemical and enzymatic methods, animal model experiments express digestibility of proteins, bioavailability of amino acids present in the food and nutrient interactions with other components.

These experiments are based on weight gain or nitrogen retention in test animals when fed a diet containing the specific protein. The comparison is made by feeding a protein free diet as the control. Proteins in the diet are used to maximize the growth. Animal model data can be used to express the quality as protein efficiency ratio (PER) or net protein ratio (NPR). PER

is the weight gained per gram (growth) protein consumed and NPR provides information on the ability of proteins to support both growth and maintenance. Apparent protein digestibility gives a measure of nitrogen uptake and loss through faeces.

True digestibility (TD) measure requires a correction for metabolic or endogenous nitrogen. Information on the quantity of the absorbed nitrogen that is actually retained or utilized by the body is reflected by the biological value (BV) of the protein. This takes into account the loss of absorbed and endogenous nitrogen in urine as well. The percentage nitrogen intake retained (net protein utilization) by the body can be obtained by the product of TD and BV. The interpretation of data needs to take into account the differences in efficiency of utilization of certain amino acids by rodents when compared to humans.

Other animal assays include assays for enzyme activity, changes of essential amino acids in plasma or gain in body weight of animals previously fed a protein-free diet. Thus based on the availability of facilities and the cost of the experiments to be performed any of the above assays can be used to determine the protein quality.