THE SCIENCE WORLD
A Monthly e Magazine
ISSN:2583-2212
July, 2023; 3(07), 1316-1319

Popular Article

# Laboratory Animal Feeding Management

**Mahendra Kumar Meena[1], Rashmi[2]**
[1]Assistant Professor, Apollo College of Veterinary Medicine, Jaipur
[2]PhD Scholar, PGIVER, Jaipur
https://doi.org/10.5281/zenodo.8147739

***Abstract***

The nutritional management of laboratory animals is one of the important management aspects of the laboratory animal's care. Since, the inadequate quantity and quality of food, changes the various normal physiochemical, biological and behavioral responses of the laboratory animals, thus, altering the aforesaid parameters and ultimately the research/diagnosis findings, for which these animals are reared. A nutritionally balanced diet is important both for the welfare of laboratory animals and to ensure that experimental results are not biased by unintended nutritional factors. Laboratory animal food should contain adequate nutrition, including formulation and preparation; freedom from chemical and microbial contaminants; bio-availability of nutrients should be at par with the nutritional requirement of the animal.

## Introduction

The nutritional management of laboratory animals is one of the important managemental aspects of the laboratory animal's care. Since, the inadequate quantity and quality of food, changes the various normal physiochemical, biological and behavioral responses of the laboratory animals, thus, altering the aforesaid parameters and ultimately the research/diagnosis findings, for which these animals are reared. A nutritionally balanced diet is important both for the welfare of laboratory animals and to ensure that experimental results are not biased by unintended nutritional factors.

## Factors affecting nutrient requirements

### Genetics

Genetic differences among species, breeds, strains, stocks, sexes, and individuals may affect nutrient requirements. For example, the lack of L-gluconolactone oxidase (a key enzyme required for the synthesis of ascorbic acid) in some species is apparently the consequence of genetic mutation).



Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
*Published:*13.07.2023

There is evidence that mouse strains may differ in requirements for riboflavin, pantothenic acid, and other nutrients. Genetic differences in growth potential among species, strains, and sexes may influence the daily requirements for amino acids and other nutrients that are incorporated into tissues.

**Stage of Life**

Nutrient requirements change during stages of the life cycle, especially in response to growth, pregnancy, or lactation. Synthesis of tissues or products requires amino acids, fatty acids, minerals, glucose, or other substrates as well as increased amounts of vitamins and associated cofactors. The physiological state of the animal also plays an essential role in food intake. Several reports show increased intake with the onset of pregnancy, but other reports suggest few changes, if any.

**Environmental Impacts**

The laboratory animals are usually studied under controlled conditions with minimal diurnal or seasonal variation in temperature, light cycle, or other environmental conditions. Marked modification in these conditions may alter nutrient requirements. High temperature, disturbing stimuli, social conflict, or other environmental factors that reduce food intake may necessitate diets higher in nutrient concentrations to maintain adequate nutrient intakes. Housing types can also affect the amounts of nutrients needed in diets. For example, laboratory rodents maintained in either galvanized cages or cages with solid bottoms may have a lower dietary requirement for zinc because of the availability of zinc from the feces and cage materials. Solubilized minerals in drinking water (such as copper from copper water lines) may affect the amounts of these minerals that must be supplied by the diet. If laboratory animals ingest bedding or other "nonfood" materials, these may provide an unintended source of some nutrients or toxins. In studies of the requirements of laboratory animals for constituents that might be needed at extremely low concentrations, even the air supply may be a significant source of contamination.

**Microbiological Status**

Under normal rearing conditions, laboratory animals harbors populations of microorganisms in the digestive tract. These microorganisms generate various organic constituents as products or by-products of metabolism, including various water-soluble vitamins and amino acids. The extent to which these nutrients contribute to the nutrition of the host may be substantial but varies according to species, diet composition, and rearing conditions. In the rat and mouse, most of the microbial activity is in the colon, and many of the microbially produced nutrients are not available to the host unless faeces are consumed, as is common for rats and other rodents.



Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com

***Published:*** **13.07.2023**

**Research Conditions**

Experimental procedures may produce stress or otherwise alter food intake. For example, surgical procedures or test substances in diets may lead to anorexia, necessitating the provision of more palatable diets or with elevated nutrient concentrations. Experimental protocols that require restriction of food quantity offered alter the intakes of all nutrients unless dietary concentrations are altered to account for changes in food consumption.

**Nutrient Interactions**

Alterations in dietary energy density usually cause a change in feed intake. If high-energy diets are used, it may be necessary to increase nutrient concentrations in the diet to compensate for decreased food consumption. Other interactions occur between nutrients, such as competition for absorption sites among certain minerals that share common active transport systems. Thus in formulating diets containing unusual nutrient concentrations, the potential effects on other nutrients must be considered and adjustments made in nutrient concentrations, if appropriate.

**Table 1: Average Feed Intake (g/day) of different species of Laboratory Animals**

| Species | Growing | Adult | Pregnant | Lactating |
|---|---|---|---|---|
| Mouse | 3–5 | 5–7 | 6–8 | 7–15 |
| Rat | 8–25 | 25–30 | 25–35 | 35–65 |
| Hamster | 6-12 | 10-12 | 12-15 | 20-25 |
| Guinea pig | 35-45 | 45-70 | 70-80 | 100-130 |
| Rabbit | 120-200 | 200-300 | 300 | 300-400 |

**Table-2: Basic nutrients required for different Species of Laboratory Animals**

| Nutrients | Mice | Rat | Monkey | Guinea pig | Rabbit |
|---|---|---|---|---|---|
| Crude protein (% min) | 20.0 | 20.0 | 20.0 | 24.0 | 20.0 |
| Ether extract (% min) | 4.0 | 4.0 | 6.0 | 3.5 | 3.5 |
| Crude fiber (% max) | 4.0 | 4.0 | 4.0 | 12.0 | 12.0 |
| Ash (% maximum) | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| Calcium (% minimum) | 1.0 | 1.0 | 1.0 | 1.2 | 1.2 |
| Phosphorus (% min) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| Nitrogen free extract (%) | 55.0 | 53.0 | 53.0 | 43.0 | 47.0 |
| Metabolizable energy (Kcal/Kg) | 3600 | 3600 | 4000 | 3000 | 3000 |



Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com

***Published:***13.07.2023

**Important points to be consider while feeding laboratory animals**

1. Animals should be fed palatable, non-contaminated, and nutritionally adequate food daily unless the experimental protocol requires otherwise.
2. Feeders should allow easy access to food, while avoiding contamination by urine and faeces.
3. Food should be available in a mount sufficient to ensure normal growth in immature animals and maintenance of normal body weight, reproduction, and lactation in adults.
4. Food should contain adequate nutrition, including formulation and preparation; freedom from chemical and microbial contaminants; bio-availability of nutrients should be at par with the nutritional requirement of the animal.
5. Laboratory animal diets should not be manufactured or stored in facilities used for farm feeds or any products containing additives such as rodenticides, insecticides, hormones, antibiotics, fumigants, or other potential toxicants.
6. Areas in which diets are processed or stored should be kept clean and enclosed to prevent entry of insects or other animals. Precautions should be taken if perishable items such as meats, fruits, and vegetables are fed, because these are potential sources of biological and chemical contamination and can also lead to variation in the amount of nutrients consumed.
7. Diet should be free from heavy metals (e.g., Lead, Arsenic, Cadmium, Nickel, and Mercury), naturally occurring toxins and other contaminants.
8. Exposure to extremes in relative humidity, unsanitary conditions, light, oxygen, and insects hasten the deterioration of food. Meats, fruits, vegetables, and other perishable items should be refrigerated if required to be stored. Unused, open food should be stored in vermin – proof condition to minimize contamination and to avoid potential spread of disease agents.
9. Food hoppers should not be transferred from room to room unless cleaned and sanitized. The animal feed should contain moisture, crude fiber, crude protein, essential vitamins, minerals crude fat and carbohydrate for providing appropriate nutrition.



Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com

***Published:*****13.07.2023**