FROM FORAGE TO FEED: UNDERSTANDING RABBITS' NUTRITIONAL NEEDS

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ABSTRACT

The global demand for rabbit production is increasing due to its economic and nutritional benefits. Rabbits are widely raised for their meat, fur, and fibre, making proper nutrition essential for their health, growth, and reproduction. A well-balanced diet improves productivity and enhances the quality of rabbit-derived products. As herbivores, rabbits require a fibre-rich diet to support their unique digestive system, which relies on microbial fermentation in the caecum. Fibre plays a crucial role in maintaining gut motility, preventing digestive disorders, and promoting dental health. Proteins and essential amino acids, such as lysine and methionine, are vital for growth and reproduction, while fats support energy provision and vitamin absorption. Additionally, rabbits practice coprophagy to obtain B-complex vitamins and microbial protein, further enhancing nutrient utilization. Water also plays a vital role in digestion, particularly for lactating does. Feeding systems range from traditional backyard methods using local roughages to commercial pellet-based diets designed for balanced nutrition. Recent advancements in rabbit nutrition, such as the use of nutraceuticals like spirulina, azolla, and fermented plant by-products, have contributed to improved productivity and sustainability. However, challenges such as high fibre requirements and limited digestibility persist. Rabbit production can be enhanced by integrating scientific innovations with optimized feeding strategies. This article highlights essential nutritional considerations for effective rabbit management and improved production efficiency.

INTRODUCTION

Rabbits (*Oryctolagus cuniculus*) are raised across various regions for meat, fur, fibre, or as pets. Proper feeding management is essential for their health and well-being. As herbivores, rabbits have specific dietary requirements to support their digestive and dental health, as well as overall vitality. Their diet typically consists of grains, hay, and fresh greens.

Rabbits produce two types of faecal matter: soft and hard. They practice coprophagy, consuming the soft faeces directly from the anus as it is excreted. This behaviour begins at around 2–3 weeks of age when young rabbits start consuming solid feed. Fibrous feeds undergo fermentation in the caecum, where microbial activity initiates digestion. The soft faeces, rich in B-complex vitamins, microbial protein, and partially fermented feed, are re-ingested, allowing further digestion and nutrient absorption. In backyard rabbit farming, locally available roughage and home-grown feed or milling by-products are commonly used. However, commercially produced pelleted feeds, formulated with a balanced mix of grains, oil cakes, and brans, are also available to meet rabbits' nutritional needs efficiently.

FEEDING SYSTEMS

Rabbits can thrive on feeds that do not compete with human food, such as forages and grain milling by-products. They are raised under two feeding systems: backyard and cage-rearing. In the backyard system, rabbits consume high-quality grasses, leguminous fodders, fodder tree leaves, and vegetables like carrots and beetroots. Homemade feeds often contain legumes (about 50-60%), grains (oats, barley, maize, millets, molasses), protein sources (soybean, groundnut at 16-17%), mineral supplements, and salt (ICAR, 2013). However, poor mixing can lead to selective feeding and wastage, sometimes resulting in low-fiber diets. The feed conversion ratio (FCR) is crucial in rabbit farming, as inefficient feed use increases costs. Since feeding accounts for 60-65% of total expenses, commercial cage-rearing systems are preferred for better productivity. Rabbits in this system receive complete pelleted diets formulated to meet their nutritional needs. These pellets, made from plant-based ingredients

like lucerne, berseem, grains, mill by-products, and protein, vitamin, and mineral supplements, ensure balanced nutrition for different production functions.

NUTRITIONAL REQUIREMENT OF RABBIT

Growing rabbits require approximately 9.5 kcal of digestible energy (DE) per gram of body weight gain, with a range of 9.59-10.90 kcal when growing at 12 g/day. A diet containing 2,500 kcal DE/kg can meet their energy needs. Rabbits efficiently utilize plant fibres, which are essential for gut health. Diets with less than 12% fibre may cause gut stasis and diarrhoea.

Essential fatty acid deficiency can lead to poor growth, hair loss, and reproductive issues. Supplementing 0.5% conjugated linoleic acid reduces fat in heavier rabbits, while a 4% mix of sunflower and linseed oil improves growth, slaughter performance, and fatty acid profile. Adequate essential amino acids are necessary for rapid growth. While microbial protein from coprophagy helps, it may not fully meet amino acid needs. Rabbits are inefficient at using non-protein nitrogen, making dietary protein crucial. ICAR (1998) recommends 18% crude protein (CP) for growing rabbits, with soybean meal and groundnut cake as common protein sources. Alternative protein sources include sunflower, mustard, til, cottonseed cakes, and guar meal. A balanced diet should contain 0.6% arginine, 0.65% lysine, and 0.6% sulphur-containing amino acids. Protein needs to rise to 20% for reproduction due to larger litter sizes. Rabbits use fat for energy and vitamin absorption, typically obtaining 2-5% DM fat from plant-based diets. While added fat can enhance palatability, excessive intake may lead to obesity, hepatic lipidosis, and atherosclerosis (Das *et al*., 2014).

Table: Nutrient requirements of rabbits (ICAR, 2013)

Nutrient	Growth	Maintenance	Gestation	Lactation
Digestible energy (kcal)	2700	2200-2300	2700	2700
Crude Protein (%)	18	14	18	19
Arginine (%)	0.6	0.6	0.6	0.6
Lysine (%)	0.7	0.5	0.7	0.7
Meth. & Cyst (%)	0.6	0.4	0.7	0.7
Digestible CP (%)	12-14	10-11	12-14	12-14
Crude Fibre (%)	12	12-14	12	10-12
ADF (%)	16-18	16-18	16-18	16-18
Fat/lipids (%)	2-4	2	2	2

WATER REQUIREMENT

Water is an essential nutrient for rabbits and must always be kept clean, fresh, and easily accessible. It is especially crucial for lactating does, requiring continuous availability. On average, rabbits drink water equivalent to about 10% of their body weight daily. To maintain hygiene, water containers should be cleaned daily to remove sediments and thoroughly washed weekly. Alternatively, well-designed automatic watering systems can be used to ensure a consistent water supply (Das *et al*., 2014).

IMPORTANCE OF FIBER IN RABBIT NUTRITION

Many different types of microorganisms (bacteria and protozoa) normally live in the rabbit intestine and cecum and aid tremendously in fermentation and digestion of foods. Fiber is required for these microorganisms to function properly and stay in balance. Fiber also stimulates motility of the gastrointestinal tract and helps keep food moving properly so that normal digestion and absorption of nutrients can take place. Without fiber, gut motility slows down, the normal bacterial population is disrupted, and changes in gut pH and fermentation occur. This dangerous cascade of events can lead to indigestion or gut stasis, and can make a rabbit very ill. Rabbits experiencing this type of illness, called ileus, may show a decreased appetite, decreased faecal production, decreased size of faecal balls, softer faeces, weight loss, increased gas production, and possibly diarrhoea or other life threatening disease. High fiber is also necessary to keep the teeth in normal wear. A rabbit's teeth grow

continuously throughout its lifetime. In the absence of a high fiber diet, the teeth tend to overgrow, and complications can result including incisor or molar malocclusion, molar points, or tooth root and facial abscesses (Idowu, 2009).

PELLETED DIETS

Rabbits prefer pelleted diets over meal-form feeds, with some individuals refusing non-pelleted diets altogether. While others may adjust, the transition period results in low feed intake and high wastage. To improve palatability and reduce dustiness, molasses (2-6%) or fat is added to meal diets. Pelleted diets significantly enhance growth rate and feed efficiency.

A concentrate feed mix can be formulated with 50% maize crust, 20% rice bran, 28% soyabean cake, 1.5% vitamin-mineral mix, and 0.5% salt. Feed requirements vary by class: weaners (50 g), growers (75 g), finishers (100 g), adults (125 g), and nursing mothers (200 g) (Das *et al.,* 2014). Preferred pellet sizes range from 3-6 mm in diameter and 10–15 mm in length for optimal consumption.

FEEDING OF RABBITS

Feeding Kits and Young Rabbits

Neonatal rabbits, known as kits, rely entirely on maternal milk for nourishment during their first three weeks of life. This milk is rich in immunoglobulins, providing passive immunity against infections. By the third week, kits begin to nibble on solid food from their mother's diet. Weaning generally occurs between 3 to 5 weeks of age, after which juveniles exhibit a sharp increase in feed intake until their dry matter (DM) consumption stabilizes at around 5.5% of body weight, maintaining this level until they reach physiological maturity. Proper post-weaning nutrition is essential for healthy growth and metabolic development. An optimal feed formulation includes 40% cornmeal, 20% wheat bran, 10% rice bran, 11% groundnut cake, 7% fish meal, and 3% bone meal, along with 0.5% salt and 0.5% trace mineral premix to support overall health and development.

Feeding Adult Does

To prevent obesity, adult does are fed controlled amounts. A "flushing ration" before and after mating improves fertility. Pregnant does require 200-250 g of balanced feed plus 100 g of fresh grass daily. Food intake drops before birth but peaks 20-30 days into lactation.

Importance of Chewing

A rabbit's diet should include fibrous foods that encourage natural chewing to ensure even tooth wear. Without proper roughage, the enamel on their teeth may grow unevenly, leading to sharp edges that cause oral pain, excessive salivation, and difficulty eating. To promote dental health, rabbits can be given chew sticks made from safe, untreated wood or other non-toxic materials.

Feeding Schedule

Establishing a consistent feeding routine benefits rabbits' digestion and overall health. Concentrated feeds should ideally be given at fixed times, such as 7 a.m. and 5 p.m. Since rabbits are more active in the evening, bulky fresh feed should be offered during this period. All food provided must be fresh, clean, and free from contaminants.

RECENT ADVANCES IN RABBIT FEEDING

Use of Nutraceuticals

Recent nutraceuticals such as spirulina, azolla, garden cress, yogurt, milk whey, and bee venom are emerging as effective unconventional dietary alternatives in rabbit farming. These functional foods, known for their nutritional and therapeutic properties, can replace artificial drugs such as antibiotics, enhancing productivity, reproduction, physiology, and immunity in rabbits. Incorporating these natural substances individually or in combination into rabbit diets can improve welfare and boost both quantitative and qualitative productivity. Additionally, utilizing plant and animal by-products through methods like fermentation can enhance their nutritional value, significantly reducing feed costs. These nutraceuticals show great promise as sustainable growth, health, and reproduction promoters, particularly in temperate and subtropical climates (El-Sabrout *et al*., 2023).

Impact of Dietary Fibre

Studies have shown that incorporating various sources of dietary fibre can positively influence growth performance and gut microbiota composition in rabbits. For instance, the inclusion of alfalfa meal and peanut vine in rabbit diets has been found to improve growth rates and slaughter performance compared to beet pulp, with specific increases in beneficial metabolites like butyric acid. This highlights the importance of selecting appropriate fibre types to optimize rabbit nutrition (Liu *et al*., 2022).

CONSTRAINTS IN RABBIT FEEDING

High Fiber Requirement

Rabbits must be fed a high-fibre diet (15% or more crude fibre) based on forage (usually alfalfa meal) and high-fibre grain-processing by-products such as wheat bran. It is not possible to successfully raise rabbits on a high-energy corn-soy diet. Dietary fibre is necessary for the maintenance of gastrointestinal health in rabbits. Low-fiber diets can lead to severe digestive disorders, including enteritis and entero-toxemia, which are often fatal. Unlike other livestock such as poultry or swine, rabbits cannot thrive on high-energy, low-fibre diets, making their nutritional management more complex and costly (Lukefahr *et al*., 2004).

Digestibility Issues

The digestibility of fibrous components is crucial. The degree of lignification in forage also affects digestibility; higher lignification results in lower nutrient absorption (Mailafia *et al*., 2010). The dietary fibre in rabbit diets is poorly digested and is excreted in the faeces.

CONCLUSION

Effective feeding management is essential for optimal rabbit growth, reproduction, and overall health. As herbivores, rabbits require a fibre-rich diet to maintain gut health and prevent digestive disorders like gut stasis. Feeding systems range from backyard methods using local resources to commercial pelleted diets that ensure balanced nutrition. While backyard feeding is cost-effective, it often results in inconsistent nutrition, slower growth, and lower productivity. Pelleted diets, however, optimize feed efficiency and meet the specific needs of different production stages. Key nutrients include energy, protein, essential fatty acids, and amino acids, all of which enhance growth, reproduction, and meat quality. Emerging feed innovations, such as spirulina, azolla, and fermented plant by-products, offer sustainable ways to improve rabbit health and productivity. Despite challenges in meeting high fibre requirements, scientific advancements in nutrition can enhance rabbit farming's contribution to the meat, fur, and fibre industries while ensuring sustainability.

REFERENCES

Das, S. K., Chakurkar, E. B., & Singh, N. P. (2014). Rabbit as an alternative source of meat production. *Technical Bulletin*, (45), ICAR Research Complex for Goa, Old Goa.

El-Sabrout, K., Khalifah, A., & Ciani, F. (2023). Current applications and trends in rabbit nutraceuticals. *Agriculture*, 13(7), 1-18.

ICAR, (1998). Nutrient Requirements of Livestock and Poultry, Publication and Information. Division, Indian Council of Agricultural Research, New Delhi.

ICAR, (2013). Nutrient Requirement of Animals- Sheep, Goat and Rabbits, 3rd ed. Indian Council of Agricultural Research, New Delhi.

Idowu, O. M (2009). Rabbit Nutrition & Feeding, Federal University of Agriculture, Abeokuta, Ogun State, https://funaab.edu.ng/wp-content/uploads/200/12/459_ann% 20508 %20le cture%20note%20_rabbit_.pdf

Liu, B., Cui, Y., Ali, Q., Zhu, X., Li, D., Ma, S., Wang, Z., Wang, C., & Shi, Y. (2022). Gut microbiota modulate rabbit meat quality in response to dietary fiber. *Frontiers in Nutrition*, 9, 849429.

Lukefahr, S. D., Cheeke, P. R., McNitt, J. I., & Patton, N. M. (2004). Limitations of intensive meat rabbit production in North America: A review. *Canadian Journal of Animal Science*, 84(3), 349-360.

Mailafia, S., Onakpa, M. M., & Owoleke, O. E. (2010). Problems and prospects of rabbit production in Nigeria-A review. *Bayero Journal of Pure and Applied Sciences*, *3*(2), 20-25.

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