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Feeding India's Future: Role of Poultry in Bridging the Protein Gap

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Feeding 1.4 Billion: India's Growing Nutrition Challenge

India is home to nearly 1.44 billion people, making it one of the most populous countries in the world (United Nations, World Population Prospects 2024). Ensuring adequate and balanced nutrition for such a large population remains a major challenge. Although agricultural productivity and food availability have improved in recent decades, deficiencies of essential nutrients continue to affect a significant proportion of the population. Food security today is not only about producing enough calories but also about providing diets that are nutritionally balanced and rich in essential nutrients. As India's population continues to grow and dietary patterns evolve, improving access to affordable and high-quality sources of nutrients will become increasingly important for public health and national development.

Protein: The Building Block of Health:

Protein is a vital component of human nutrition. It plays an essential role in growth, tissue repair, immune function, enzyme activity, and numerous metabolic processes within the body. Adequate protein intake is therefore necessary for maintaining health and supporting physical and cognitive development. International nutritional guidelines recommend a daily protein intake of approximately 0.83 g per kilogram of body weight, which corresponds to roughly 50–60 g of protein per day for an average adult (WHO). Similarly, the ICMR–National Institute of Nutrition recommends a daily intake of 0.8–1.0 g of protein per kilogram of body weight for Indian adults (ICMR–NIN, 2024). However, the quality of dietary protein is as important as the quantity. High-quality proteins contain all essential amino acids in appropriate proportions and are more efficiently utilized by the body. Therefore, improving access to high-quality protein sources is an important step toward strengthening nutritional security.

India's Hidden Protein Gap:

Despite the recognized importance of protein in human nutrition, protein deficiency remains a concern in India. A large proportion of the population relies heavily on cereal-based diets, which provide

most of the daily protein intake but are often deficient in essential amino acids such as lysine. As a result, even when total protein intake appears adequate, the biological quality of the diet may not meet physiological requirements. National dietary assessments suggest that protein contributes only about 12% of total daily energy intake in many Indian diets, which is lower than the recommended 15% contribution from protein (Anjana et al., 2025). This imbalance highlights the need for nutrient-dense and affordable protein sources that can improve dietary quality without significantly increasing food costs.

Why Eggs and Chicken Matter for Nutrition:

Poultry products, particularly eggs and chicken meat, are among the most efficient and affordable sources of high-quality dietary protein. These foods contain all essential amino acids required by the human body and are easily digestible. On average, 100 g of skinless chicken meat contains about 20–23 g of protein, making it an excellent source of high-biological-value protein with a complete profile of essential amino acids such as lysine, leucine, isoleucine and methionine. More than 40% of the amino acids in chicken meat are essential amino acids, which are required for human growth and tissue repair. In addition to protein, chicken meat provides important micronutrients. For example, 100 g of chicken meat supplies around 200 mg phosphorus, 220–260 mg potassium, about 1 mg iron, and 1–1.7 mg zinc, along with trace minerals such as selenium. It is also a good source of B-complex vitamins, particularly niacin (about 10–14 mg per 100 g) and vitamin B6 (~0.5 mg), which play important roles in energy metabolism and nervous system function. Chicken meat is relatively low in fat compared with many red meats and contains beneficial fatty acids, including mono- and polyunsaturated fatty acids (Suliman et al., 2023). Because of this combination of high-quality protein, essential amino acids, and valuable micronutrients, chicken meat is considered an important and nutritious component of human diets worldwide.

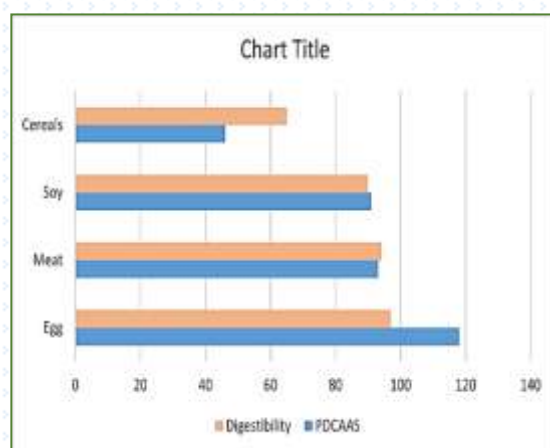


Figure 1. COMPARISON OF PDCAAS AND DIGESTIBILITY OF DIFFERENT PROTEINS. Source: Adapted from "The Health Benefits of Egg Protein", Puglisi & Fernandez, 2022.

Egg protein, for example, is widely regarded as one of the highest-quality proteins available in the human diet. It contains essential amino acids in proportions that closely match human nutritional requirements and is highly digestible, with approximately 97% of egg protein being utilized by the body. In contrast, plant proteins often have digestibility levels ranging from 45–80%. The nutritional benefits of eggs are particularly important for children. Research has shown that providing children with one egg per day for six months significantly reduced stunting and underweight prevalence in vulnerable populations (Puglisi & Fernandez, 2022). These findings highlight the potential of poultry products to improve nutritional outcomes, especially in developing countries.

Turning Feed into Food Efficiently:

One of the major advantages of poultry production is its high efficiency in converting feed into edible food. Compared with many other livestock species, poultry require significantly less feed to produce the same amount of meat. Feed conversion ratio (FCR), which measures the amount of feed required to produce one kilogram of animal product, varies widely among livestock species. Poultry typically have an FCR of around 2.0–2.3 kg of feed per kilogram of meat, whereas pigs require about 3.6–4.0 kg, and beef production systems may require 15–27 kg of feed for the same amount of meat (Wilkinson, 2011). Studies also show that poultry convert approximately 13% of feed energy into edible food, compared with about 9% for pigs and only 3% for beef cattle. Similarly, poultry convert about 21% of feed protein into edible protein, while pigs convert roughly 9% and cattle only 2–3% (Shepon et al., 2016). In practical terms, producing 1 kg of poultry meat requires about 4.2 kg of feed, whereas pork requires roughly 6 kg and beef production may require more than 30 kg of feed. Because of these biological and production advantages, poultry are widely considered one of the most efficient sources of animal protein available today.

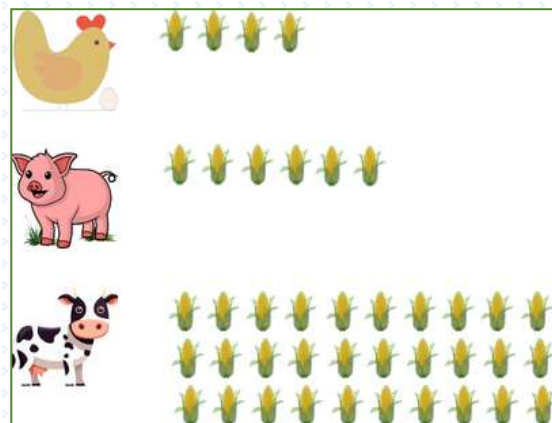


Figure 2. COMPARING FEED CONVERSION EFFICIENCY FOR 1 KG EDIBLE MEAT. Source: Based on data from Shepon et al. (2016)

TABLE 1. FCR OF DIFFERENT LIVESTOCKS.

Livestock	Typical FCR (kg feed/kg product)
Poultry	≈2.0–2.3
Pig	≈3.6–4.0
Beef cattle	≈15–27
Lamb	≈29–34

Source: Adapted from Wilkinson, J. (2011). *Re-defining efficiency of feed use by livestock*. *Animal*, 5(7), 1014–1022.

Table 2. Feed conversion efficiency of major livestock species

Livestock	Feed required per kg meat (kg)	Caloric conversion efficiency (%)	Protein conversion efficiency (%)
Poultry	~4.2	13	21
Pig	~6	9	9
Beef cattle	>30	3	2–3

Source: Adapted from Shepon, A., Eshel, G., Noor, E., & Milo, R. (2016). *Environmental Research Letters*, 11, 105002.

Waste to Food: Poultry's Hidden Advantage

Another important advantage of poultry production is its ability to utilize agro-industrial by-products and food processing residues as feed ingredients. Various agricultural and industrial wastes, including cassava residues, fruit pomace, tomato processing waste, and hatchery by-products, can be

incorporated into poultry diets. Research suggests that such by-products can replace 3–40% of conventional feed ingredients without negatively affecting bird growth or feed efficiency (Sugiharto & Nuengjamnong, 2025). This capacity allows poultry production systems to transform materials that might otherwise become environmental waste into valuable animal protein. By improving the utilization of agricultural by-products, poultry production can contribute to circular food systems, reducing waste while enhancing the efficiency of food production.

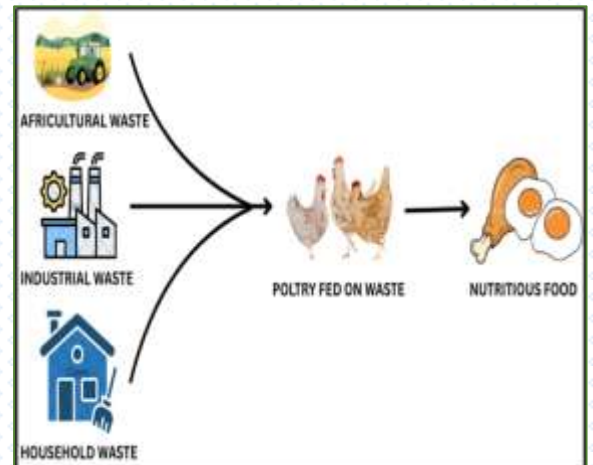


Figure 3. DEPICTING POULTRY FED ON WASTE.

Poultry Fits India's Food Culture:

Cultural and religious factors also influence dietary choices in India. Certain meats face restrictions among specific religious groups. For example, beef consumption is avoided by many Hindus, while pork consumption is restricted among Muslims. In contrast, poultry products such as chicken and eggs face fewer religious or cultural restrictions and are therefore widely consumed across different communities. Their availability, affordability, and culinary versatility have contributed to their growing acceptance in Indian diets. As a result, poultry has become one of the most commonly consumed animal-source foods in India and plays an increasingly important role in improving dietary diversity and nutritional intake (Scudiero et al., 2023).

Why Poultry Matters for India's Future:

Ensuring adequate and high-quality protein intake for India's growing population remains a critical nutritional challenge. Poultry production offers a practical solution because it can provide affordable, nutrient-dense animal protein in the form of eggs and chicken meat. The high feed efficiency of poultry production, combined with its ability to utilize agro-industrial by-products, makes it one of the most sustainable livestock production systems. By converting feed and agricultural residues into high-quality food, poultry can contribute to both nutritional security and environmental sustainability. Strengthening poultry production systems and encouraging the efficient use of alternative feed resources could therefore play an important role in addressing protein deficiency, improving food security, and supporting sustainable food systems in the years ahead.

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