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Poultry Meat: Nutritional, Sensory and Commercial Analysis from Production to Consumption

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Abstract:Poultry meat plays a central role in today's food systems due to its nutritional profile, sensory qualities, and market adaptability. This study explores the factors that influence poultry meat quality, from protein and micronutrient content to consumer-driven attributes like tenderness and flavor. Efficient production, low cost, and flexibility in product development strengthen its commercial appeal. Integrating nutritional, sensory, and economic perspectives is essential to improve meat quality, align with sustainability goals, and meet evolving consumer expectations..

• Introduction

Over the past decades, poultry meat—mainly chicken and turkey—has become a staple food worldwide, registering the fastest growth among all meat types. In 2023, global poultry meat production exceeded 139 million tons, marking a 3% increase from the previous year, with rapid industrial expansion observed in Brazil and the United States.

In parallel, countries like Romania have experienced a significant increase in poultry consumption, with rates growing by 39% between 2014 and 2020.This growth is driven by multiple factors: its favorable nutritional profile (high-quality protein, low fat), affordability, and adaptability to various culinary applications.

Technological advancements have reduced broiler growth cycles from 110 days to just 6 weeks, improving efficiency but also raising new quality concerns.Today's consumers demand more than cost-effectiveness—they value animal welfare, meat texture, sensory appeal, and production transparency. At the same time, challenges such as muscle abnormalities (e.g., woody breast, white striping), meat uniformity, and quality degradation during processing have become central issues. These trends call for a multidimensional assessment of poultry meat quality, integrating nutritional, structural, and commercial aspects..

• Material and method

This review is based on extensive bibliographic research, aiming to explore the nutritional, sensory, and commercial factors that influence poultry meat quality across the production chain. A wide range of scientific literature was analyzed, including peer-reviewed articles, academic theses, and official reports from FAO, EFSA, USDA, and the European Commission. Key databases consulted include PubMed, ScienceDirect, Scopus, Web of Science, and Google Scholar, with selected studies published between 2014 and 2024. Romanian national data (INSSE) were also referenced to reflect local market dynamics. Inclusion criteria focused on works addressing poultry meat composition, sensory attributes (tenderness, color, juiciness), processing influences, and sustainable feed alternatives such as insects, legumes, and agro-industrial by-products. A thematic synthesis was used to extract consistent trends and evaluate the strategic role of poultry meat in sustainable agri-food systems.

• Results and discussions

1. Sensory Attributes of Poultry Meat

- Poultry meat quality is closely associated with sensory traits such as tenderness, juiciness, aroma, flavor, and appearance. Tenderness is largely influenced by factors like muscle fiber diameter, collagen composition, and post-mortem processing (e.g., rigor mortis conditions, chilling rate). Younger birds typically produce more tender meat due to higher collagen solubility and reduced connective tissue density. Juiciness depends on fat content and water-holding capacity, while aroma and flavor are shaped by Maillard reactions and dietary components. Visual appearance, including meat color, is critical for consumer acceptance and is affected by myoglobin content, pH, and pre-slaughter stress.

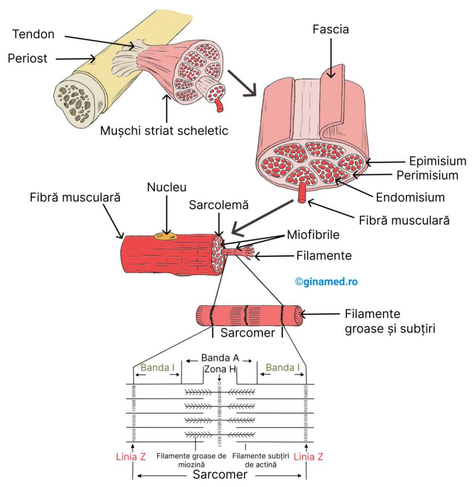

Figure 1. Structure of Skeletal Striated Muscle

This diagram shows the hierarchical organization of skeletal striated muscle, starting from macroscopic structures (muscle, fascicles, muscle fibers) to microscopic components (myofibrils and sarcomeres). It highlights key anatomical features such as tendons, fascia, connective tissue layers (epimysium, perimysium, endomysium), and the sarcomere — the fundamental unit of muscle contraction composed of actin and myosin filaments.

2. Influence of Feed Composition Feeding strategies significantly affect meat quality, particularly fat composition and flavor. Traditional broiler diets based on corn and soybean meal provide efficient growth but raise concerns related to deforestation, GMO use, and resource competition. Insects (Hermetia illucens, Tenebrio molitor), legumes (fava beans, lupins), DDGS, and microbial proteins (e.g., spirulina, yeast) are emerging as viable protein alternatives. Studies show that up to 15–20% inclusion of insect meal or legumes can maintain meat quality with minimal sensory changes. However, some ingredients (e.g., cassava leaf meal, alfalfa) may impart color shifts or require defatting (in the case of insect meal) to reduce saturated fat levels.

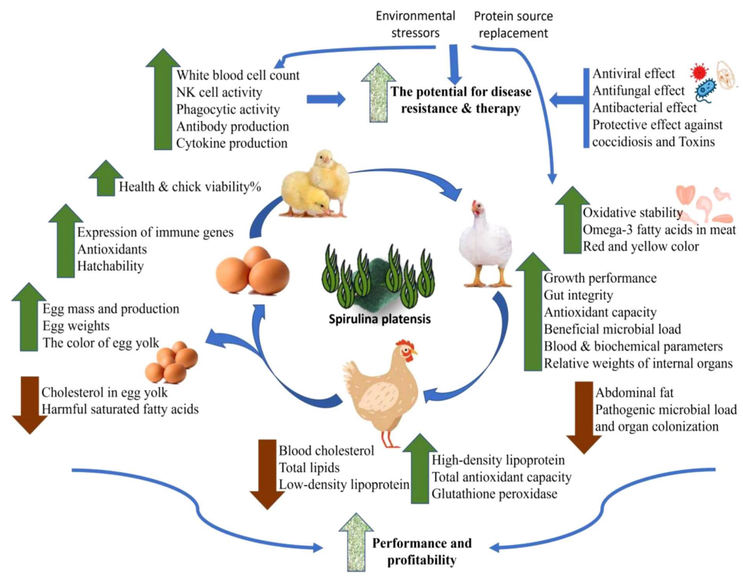

Figure . Effects of Spirulina platensis Supplementation on Poultry Health, Productivity, and Immune Response (https://doi.org/10.3389/fvets.2022.1072787)

3. Technological Interventions and Post-Mortem HandlingTechnological interventions such as electrical stimulation and optimized chilling protocols can improve tenderness and color stability. Aging the meat under controlled conditions enhances proteolytic degradation of muscle proteins, leading to better texture. Rapid chilling before rigor mortis can cause cold shortening, while high temperatures can induce hot shortening—both detrimental to tenderness. Optimal rigor mortis development occurs around 15 °C. Marination and enrichment techniques are also applied in the industry to improve water retention and overall palatability.

4. Commercial Implications and Quality Defects Fast-growing broiler lines deliver high production efficiency but are more prone to muscle myopathies like "woody breast" and "white striping," which reduce meat value and lead to product downgrading. Premium market niches have emerged around slow-growing breeds and animal welfare–certified systems (e.g., free-range, organic), offering improved flavor and texture and aligning with consumer ethical expectations. Meat from such systems often has higher PUFA content, more pronounced flavor, and better oxidative stability.

5. Sustainability and Market Trends Poultry meat offers a favorable environmental profile (6–7 kg CO_2 e/kg) compared to beef or pork. Its short life cycle, efficient feed conversion ratio, and adaptability make it the most accessible protein source globally. However, the sector faces sustainability challenges related to feed sourcing, manure management, and animal welfare. Integrating circular practices such as using insect-based feeds, renewable energy on farms, and valorizing by-products (e.g., skin, bones, offal) contributes to improved ecological outcomes. The market is also adjusting to new trends like plant-based alternatives and increased transparency in labeling and traceability.

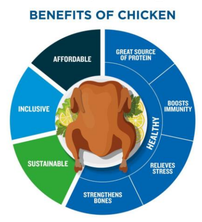

Figure 3. Multifunctional Benefits of Chicken Meat for Human Health and Food Systems

• Conclusions

Poultry meat quality is shaped by a complex interplay of nutritional, genetic, environmental, technological, and commercial factors. Ensuring consistently high quality requires an integrated, multidisciplinary approach that addresses the entire production chain—from feed formulation and animal welfare to processing techniques and sustainability practices. Modern feeding strategies, including the use of alternative protein sources and natural antioxidants, can enhance both nutritional value and sensory properties. Genetic selection must prioritize not only performance but also muscle health and welfare. Environmental enrichment and stress reduction are essential for maintaining meat integrity. Technological processing, particularly post-mortem handling and cold chain management, directly influences texture, flavor, and safety. At the commercial level, growing consumer expectations around sustainability, ethics, and transparency must be met through innovation and collaboration. Ultimately, the future of poultry meat lies not just in maximizing output, but in balancing quality, sustainability, and consumer trust—ensuring its continued role as a key protein source in a responsible, resilient food system.