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GAME MEAT AND CONVENTIONAL MEAT: A COMPARATIVE REVIEW OF NUTRITIONAL COMPOSITION AND TECHNOLOGICAL CHARACTERISTICS

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Abstract

This review analyzes the nutritional profile and technological properties of game meat in comparison with conventional meat, based on a structured search of scientific databases such as Scopus, Web of Science, and PubMed. Game meat is generally distinguished by a higher protein content, lower fat levels, and a more favorable fatty acid composition, particularly due to increased polyunsaturated fatty acids and omega-3 content. It is also an important source of essential micronutrients, including iron, zinc, and vitamin B12. From a technological standpoint, however, game meat is more prone to lipid oxidation, which can negatively impact shelf life and processing stability. In contrast, conventional meat exhibits greater oxidative stability but typically contains higher levels of saturated fat. These variations are influenced by species, diet, physical activity, and rearing conditions.

Key words*: conventional meat, game meat, nutritional profile.*

INTRODUCTION

Health-conscious consumers have driven the growing demand for meat with reduced fat and cholesterol content, which, in turn, has sparked renewed interest in suitable alternatives to meat products from traditional agricultural sources. Game meat could meet the needs of consumers today and in the coming years as an alternative to meat from domestic animals, as it is characterized by an excellent chemical composition, low fat content, an optimal ratio of unsaturated to saturated fatty acids, high protein content and a favorable protein composition, as well as a distinctive taste and aroma (Tomasevic et al., 2018). Growing consumer concern for health, food safety, and quality is driving an increasing demand for meat products with high nutritional value and optimal sensory properties (Anchidin et al., 2023; Boișteanu et al., 2025). However, consumer behavior is becoming increasingly complex and variable, influenced not only by preferences but also by product availability and past experiences. Game meat and conventional meat must be evaluated comparatively not only in terms of nutritional composition and technological characteristics but also in terms of how they align with consumer perceptions and expectations (Hoffman & Wiklund, 2006). Interest in hunted wild game meat (HWGM) is growing, but consumer perceptions and acceptance are strongly influenced by geographical and cultural contexts. Although this type of meat has characteristics that appeal to consumers (e.g., naturalness, nutritional value), market development is limited primarily by low availability and food safety concerns (Corradini et al., 2022). Game meat meets the demands of modern consumers due to its natural qualities and favorable nutritional profile; however, intensified production may compromise these advantages, particularly by altering the fatty acid composition, while gaps remain regarding the impact of production systems, post-mortem handling, and new consumption trends on the final quality (Hoffman & Wiklund, 2006). As for production and consumption strategies, the inclusion of natural antioxidants and fiber in processing methods is gaining increasing acceptance among consumers (Anchidin et al., 2024; Manoliu et al., 2024). In addition, the integration of biodegradable or active smart packaging aligns with the sustainability trends associated with the consumption of game meat, which is often considered a more natural alternative to conventional meat (Davidescu et al., 2025). In general, the available scientific evidence suggests that game meat products offer

a higher-protein, lower-fat, and lower-calorie alternative to conventional protein sources such as chicken, beef, and pork (Tomasevic et al., 2018; Ciobanu et al., 2020; Boișteanu et al., 2024). This article aims to highlight the differences between game meat, which has a superior nutritional profile compared to conventional meat (more protein, less fat, and a favorable fatty acid profile), but has technological limitations, particularly a higher susceptibility to lipid oxidation, which affects its stability and shelf life. The differences between the two types of meat are determined by factors such as species, diet, activity level, and rearing system.

MATERIALS AND METHODS

This study was designed as a narrative review, aiming to synthesize and critically discuss existing scientific literature regarding the nutritional composition and technological characteristics of game meat in comparison with conventional meat. A comprehensive literature search was conducted using major scientific databases, including Scopus, Web of Science, and PubMed. The search was performed using combinations of the following keywords:

1. *"game meat"*, *"venison", "wild meat"*;
2. *"conventional meat"*, *"red meat"*;
3. *"nutritional composition"*, *"fatty acid profile"*;
4. *"technological properties"*, *"meat quality"*, *"lipid oxidation"*.

Boolean operators (AND, OR) were applied to refine the search results.

Table 1. Inclusion and exclusion criteria applied in the literature selection process

Inclusion criteria	Exclusion criteria
Peer-reviewed articles published in English;	Non-scientific publications (e.g., reports without peer review);
Studies focusing on game meat and/or conventional meat;	Studies lacking relevant comparative or compositional data;
Research addressing nutritional composition and/or technological properties;	Duplicate records.
Publications from approximately the last 20-25 years, with emphasis on recent findings.	

The selection process involved screening titles, abstracts, and full texts to identify relevant studies. The retained articles were critically analyzed and grouped according to key themes as nutritional composition (proteins, lipids, micronutrients); fatty acid profile; technological characteristics; influencing factors (species, diet, rearing system, physical activity). As a narrative review, this study does not follow a fully systematic protocol and may be subject to selection bias. However, efforts were made to include representative and high-quality studies to ensure a balanced and comprehensive overview.

RESULTS AND DISCUSSIONS

Comparative Nutritional Composition of Game and Conventional Meat

Game meat is characterized by a very low fat content, typically below 3-4%, with minimal intramuscular fat deposition. However, from a nutritional perspective, the fatty acid composition, particularly the ratio of polyunsaturated to saturated fatty acids (PUFA/SFA) and the balance between omega-6 and omega-3 fatty acids, is more relevant than total fat content. A higher PUFA/SFA ratio and a lower n-6/n-3 ratio are associated with improved cardiovascular health outcomes. Meat from grazing animals, including most game species, tends to exhibit a more favorable fatty acid profile due to higher levels of omega-3 fatty acids, especially α-linolenic acid, contributing to a reduced risk of chronic diseases (Hoffman, L. C., & Wiklund, E., 2006).

Game meat is generally characterized by a superior nutritional profile compared to conventional meat, including higher protein content, lower fat levels, and a more favorable fatty acid composition (Boișteanu et al. 2024).

In particular, the PUFA/SFA and n-6/n-3 ratios are more aligned with dietary recommendations, mainly due to the natural feeding regimes and higher physical activity of wild animals (Hoffman & Wiklund, 2006; Wood et al., 2003).

In comparison with conventional meat, game meat generally contains lower intramuscular fat and higher levels of essential nutrients, which may influence both its technological behavior and consumer perception.

A comparative overview of these differences is presented in Table 2.

Table 2. Comparative nutritional composition of game meat and conventional meat

Parameter	Game meat	Conventional meat	Scientific interpretation	References
Protein content	High	Moderate to high	Slightly higher in game meat due to greater physical activity.	Hoffman & Wiklund (2006); Valencak et al. (2015); Wood et al. (1999); Wood et al. (2003); Cordain et al. (2002)
Intramuscular fat	Very low	Moderate to high	Game meat is leaner.	
Total fat content	Low	Higher	Influenced by feeding system.	
Fatty acid profile	More favorable	Less favorable	Higher PUFA in game meat.	
PUFA/SFA ratio	Higher	Lower	Closer to recommended values in game meat.	
n-6/n-3 ratio	Lower	Higher	More balanced in game meat.	
Cholesterol content	Similar	Similar	No major nutritional differences.	
Iron (Fe)	Higher	Moderate	Rich source of heme iron in game meat.	
Zinc (Zn)	Higher	Moderate	Important micronutrient from game meat.	
Vitamin B12	Higher	Moderate	Linked to muscle metabolism.	
Energy value	Lower	Higher	Due to lower fat content.	

Wild ruminant meat is characterized by extremely low intramuscular fat content, often below 1%, although notable interspecies differences exist. While cholesterol levels may be comparable to or slightly higher than those found in domestic animals, the fatty acid composition is generally more favorable from a nutritional perspective. Specifically, wild ruminant meat contains lower proportions of saturated fatty acids and higher levels of polyunsaturated fatty acids, along with a beneficial n-3/n-6 ratio and the presence of conjugated linoleic acid (CLA). These characteristics are primarily influenced by the animals' natural diet, whereas the use of concentrate-based feeding systems has been shown to increase total fat and saturated fatty acid content while reducing PUFA, particularly n-3 fatty acids. Additionally, feeding behavior (browsers vs. grazers) further contributes to variability in fatty acid profiles among species (Ramanzin et al., 2010).

Technological Properties of Game Meat in Comparison with Conventional Meat

Wild boar meat exhibits specific sensory characteristics, including the potential occurrence of undesirable off-odours such as boar taint, as well as an increased susceptibility to lipid oxidation compared to pork. Although differences in biogenic amine content between wild boar and domestic pig products are relatively minor, rancidity development tends to be more pronounced in wild boar-derived products. However, the application of appropriate processing technologies, particularly the use of starter cultures, can significantly reduce these negative effects. Consequently, it is possible to produce reduced-fat wild boar meat products with sensory attributes comparable to conventional counterparts in terms of taste, aroma, and texture (Bauer et al., 2014).

Processing technologies play an important role in determining the technological and sensory quality of meat products. For instance, the use of liquid smoke as an alternative to traditional smoking has been shown to influence oxidative stability, flavor development, and overall product quality depending on the structural characteristics of the meat matrix (Ciobotaru et al., 2024). Such effects are particularly relevant in the case of game meat, which, due to its lower fat content and higher susceptibility to oxidation, may respond differently to processing techniques compared to conventional meat.

The incorporation of additives significantly influences the physicochemical and technological properties of meat products, particularly in heterogeneous matrices, and is especially important for game meat, which, due to its low fat content and specific muscle structure, requires technological interventions to achieve quality attributes comparable to conventional meat (Flocea et al., 2024).

Another method, the incorporation of functional ingredients, represents an effective strategy to improve the sensory quality of meat products. For example, the addition of bone broth has been shown to enhance taste, texture, and overall acceptability in processed meat products with

heterogeneous structures (Ciobotaru et al., 2024). Such approaches may be particularly beneficial for game meat, which often exhibits firmer texture and variable sensory properties, thereby requiring technological interventions to increase consumer acceptance.

The incorporation of plant-based ingredients represents a promising strategy for enhancing both the technological and nutritional quality of meat products. For instance, the addition of apple and sugar beet fibers has been shown to improve structural properties and overall product stability in meat-based formulations (Manoliu et al., 2025). Sensory quality represents a key determinant of consumer acceptance for both game and conventional meat products. Studies on processed meat products have shown that attributes such as texture, flavor, and overall acceptability are strongly influenced by product formulation and processing conditions (Ciobanu et al., 2023). These aspects are particularly important in the case of game meat, which is often characterized by a firmer texture and a more intense flavor compared to conventional meat, requiring appropriate technological adjustments to meet consumer expectations.

Therefore, careful control of processing parameters is essential to maintain the technological quality of game meat and ensure its comparability with conventional meat products (Gucianu et al., 2023; Ayaz et al., 2024).

The valorization of animal by-products represents an important strategy for enhancing sustainability and adding value to meat production systems. For instance, bone broths derived from cattle have been shown to possess significant nutritional and functional properties, depending on factors such as animal age and processing conditions (Anchidin et al., 2024). Such approaches are highly relevant for both conventional and game meat sectors, particularly in the context of circular economy principles and the need to maximize resource utilization.

Factors Influencing Differences Between Game and Conventional Meat

Wild ungulate production systems vary significantly depending on their intended purpose, namely hunting, restocking or meat production, leading to distinct management and selection strategies. Systems aimed at restocking prioritize the preservation of natural behavior, low stocking densities, minimal human interaction, and traits such as agility and adaptability. In contrast, meat-oriented production systems focus on higher growth rates, increased body weight, and more intensive feeding regimes. These divergent approaches also extend to breeding objectives, where temperament and productivity are prioritized in venison production, whereas maintaining wild traits is essential in hunting systems. Consequently, these differences in management and selection criteria have important implications for animal performance, product quality, and overall production efficiency (Piasentier et al., 2005). The differences between game meat and conventional meat are influenced by multiple interacting factors, including diet, physical activity, environmental conditions, species-specific traits, and pre- and post-mortem handling, as well as processing technologies and consumer perception, all of which contribute to variations in nutritional composition and technological quality. Feed composition significantly influences meat quality, particularly in conventional systems where ingredients such as soybean can be replaced with alternatives like chickpea to modify nutritional and functional properties (Ciobanu et al., 2025). Feed-related contaminants, such as mineral oil hydrocarbons, may influence meat quality and safety, particularly in conventional production systems where animals are exposed to industrial feed sources (Matei & Pop, 2023).

CONCLUSIONS

Game meat represents a nutritionally valuable alternative to conventional meat, characterized by higher protein content, lower fat levels, and a more favorable fatty acid profile, particularly in terms of polyunsaturated and omega-3 fatty acids. However, its increased susceptibility to lipid oxidation poses technological challenges related to shelf life and processing stability. In contrast, conventional meat offers greater oxidative stability and production consistency but is generally associated with higher saturated fat content. Overall, the differences between these two meat types are primarily driven by

species, diet, physical activity, and rearing systems, highlighting the need for optimized processing strategies to fully exploit the nutritional advantages of game meat while ensuring product quality and consumer acceptability.

USE OF GENERATIVE ARTIFICIAL INTELLIGENCE (GenAI)

The authors state that ChatGPT was used exclusively for linguistic review and refinement of the text in the "Introduction" and "Conclusions" sections of this paper. All scientific content, data processing, analyses, and interpretations were developed independently and critically reviewed by the authors.

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