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GAME MEAT AS A SUSTAINABLE AND NUTRITIOUS ALTERNATIVE TO CONVENTIONAL LIVESTOCK: A COMPARATIVE STUDY

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Abstract: The diversification of animal protein sources has become a strategic priority in modern animal production, aligning with global efforts to develop sustainable, nutritionally balanced, and ethically responsible food systems. In this context, game meat is increasingly recognized as a valuable alternative to conventional livestock products, owing to its natural origin, low lipid content, and high nutritional quality. This study comparatively evaluated the chemical composition of meat from wild species, red deer (*Cervus elaphus*) and wild boar (*Sus scrofa*), and from domestic species, namely cattle (*Bos taurus*) Angus breed, pigs (*Sus scrofa domestica*) Large White and crossbred, and sheep (*Ovis aries*) Ţurcană breed. Samples of the *longissimus dorsi* muscle were collected under controlled sanitary conditions and analyzed for protein, fat, dry matter, and ash content using standardized ISO reference methods. Game meat exhibited significantly higher protein concentrations (22.7–23.0%), and lower fat levels (1.1–2.5%) than domestic meat (20.2–22.5% protein; 4.0–8.0% fat, while ash content remained consistent across species ($\approx 1.1\%$), and dry matter values ranged between 25% to 27%. These findings demonstrate the superior nutritional profile of game meat, characterized by a high-quality protein-to-fat ratio and low energy density. Therefore, game meat should be considered a complementary, health promoting source of animal protein with potential to enhance the sustainability, diversity and nutritional value of human diets. Future microbiological and safety-oriented studies are warranted to ensure its hygienic quality and to facilitate its wider integration into safe and sustainable food systems.

Introduction

Game meat is increasingly recognized as a sustainable and nutritious alternative to conventional livestock products. Species such as red deer and wild boar live in natural habitats, are not exposed to antibiotics or growth promoters, and provide meat that is high in protein and low in fat. Although consumption remains limited in Europe, regulated processing ensures food safety. This study compares the chemical composition (protein, fat, dry matter, ash) of game meat with that of pork, sheep, and beef, based on literature data and laboratory analyses.

Material and method

In addition to the literature review, laboratory analyses were performed to compare the chemical composition of meat from game and domestic species.

Samples of *longissimus dorsi* muscle were obtained from red deer and wild boar, as well as from Angus cattle, domestic pigs (Large White and crossbreed) and Ţurcana sheep. All samples (300 g/species) originated from certified sources and were transported under controlled refrigeration conditions (0–4 °C) to ensure their integrity.

The laboratory analysis focused on determining dry matter, protein content (Kjeldahl method), fat content (Soxhlet extraction), and ash. All determinations were performed in replicates according to ISO reference standards. The results were subsequently compiled and compared with data reported in the scientific literature, allowing both validation and contextual interpretation.

Results and discussions

Species	Protein (%)	Fat (%)	Ash (%)	Dry Matter (%)
Pork	22.2	3.4	0.8	26.5
Sheep	23.7	5.7	1.0	30.1
Beef	24.0	6.4	1.0	31.1
Red deer	23.1	3.3	1.0	28.7
Wild boar	23.8	5.8	0.9	29.6

The chemical composition of meat varied across species. All samples showed a consistently high protein content (22.2–24.0%), indicating good nutritional quality in both wild and domestic meats.

Fat content presented the most notable differences. Wild boar and beef showed higher fat levels, while pork and red deer remained leaner. These variations may reflect differences in feeding behavior, physiological state, and production/harvesting conditions.

Ash content was slightly lower compared to typical reference values, suggesting differences in mineral intake or muscle deposition. Dry matter values were relatively high across all samples, indicating more nutrient-dense meat.

Overall, the analyzed meat demonstrated a favorable nutritional profile, with lean composition and elevated protein contents, supporting its value in balanced and sustainable diets.

Conclusions

- Red deer and wild boar provide meat rich in protein and low in fat, making them a lean and nutritious alternative to conventional livestock.
- The elevated dry matter content in wild species compared to reference values suggests a more concentrated nutrient composition, supporting their role as high-value protein sources.
- Further research targeting hygiene, microbiological safety, traceability, and consumer acceptance is essential to support its broader integration into the food supply chain.

