# MORPHO-STRUCTURAL AND ANATOMICAL DIFFERENCES OF THE ORAL CAVITY IN THE WILD BOAR (*SUS SCROFA FESUS*)

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***Abstract***

*The present study examines morpho-structural and anatomical variations in wild boar (Sus scrofa), with particular emphasis on dentition, tongue morphology, and cranial features, across different sexes, age classes, and ecological conditions. All individuals analyzed displayed the complete suid dental formula (I 3/3, C 1/1, P 4/4, M 3/3 = 44 teeth). Adult males developed strongly curved and elongated tusks (17–22 cm), contrasting with the shorter and thinner tusks of females (7–10 cm), while juveniles showed incomplete eruption of permanent dentition. Tongue morphology revealed sexual and ontogenetic differences: adult males had longer tongues (24–26 cm) with denser filiform papillae and slight apical keratinization, whereas females displayed shorter tongues (21–23 cm) with more flattened fungiform papillae. Cranial and skeletal traits highlighted a pronounced sexual dimorphism, with males presenting more robust skulls and reinforced mandibles. Juveniles, by contrast, exhibited underdeveloped cranial ossification and papillae in early growth stages. These morpho-anatomical differences reflect functional adaptations related to feeding ecology, reproductive behavior, and environmental pressures, with ecological conditions (e.g., diet hardness, mineral content of soils) influencing the degree of dental wear and papillary keratinization. The findings underline the importance of integrating morphological assessments into wildlife management and ecological monitoring of wild boar populations.*

***Key words:*** *wild boar, morphology, dentition, tongue, sexual dimorphism*

## INTRODUCTION

The wild boar (Sus scrofa) is one of the most widely distributed large mammals in Europe, occupying a variety of habitats ranging from lowland agricultural landscapes to mountainous forest ecosystems. Its ecological adaptability, omnivorous diet, and high reproductive potential have contributed to population growth in many regions, making it a key species both in terms of ecological balance and game management [4].

From a morphological and anatomical perspective, the wild boar exhibits clear differences related to sex, age, and environmental conditions. These variations are particularly evident in the dentition, tongue morphology, and cranial structures, which serve as reliable indicators of feeding ecology, health status, and adaptive capacity [1]. The dentition, with its complete suid dental formula, is characterized by a strong sexual dimorphism in tusk development, while the tongue, as a multifunctional organ, reflects dietary adaptations through the distribution and keratinization of lingual papillae [3].

Investigating these morpho-structural traits provides valuable insights into the biology of the species. Dentition and dental

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wear allow the assessment of age structure and habitat influences, whereas tongue morphology contributes to the understanding of feeding behavior and functional adaptations. Furthermore, sexual dimorphism in cranial and dental features emphasizes the role of intraspecific competition and reproductive strategies.

This study focuses on the morpho-structural and anatomical differences observed in wild boar individuals harvested from managed hunting grounds, with the aim of documenting and comparing variations in dentition, tongue morphology, and associated anatomical traits. The results are intended to contribute to both scientific understanding of the species and practical applications in wildlife management.

## MATERIAL AND METHOD

The study was conducted on wild boar (*Sus scrofa*) individuals harvested between 2021 and 2023 from two managed hunting grounds in Iași County, Romania: Hunting Ground no. 55 Dagâța and Strunga Hunting Ground. A total of 12 specimens were examined (6 from Dagâța and 6 from Strunga), representing both sexes and two age classes (juveniles and adults). Each specimen was recorded with respect to date of harvest, sex, age class, and hunting season (spring–summer or autumn–winter).

Age and Sex Determination

Age classes were established based on dental eruption patterns and general morphometric criteria, categorizing individuals as juvenile (incomplete permanent dentition, smaller body size) or adult (fully erupted dentition, mature body proportions). Sex determination was performed through visual examination of external genitalia and confirmed by reproductive tract inspection.

Dentition Analysis

All specimens were examined for dental characteristics, following the standard suid dental formula: I 3/3, C 1/1, P 4/4, M 3/3, totaling 44 permanent teeth. For each individual, the length of the canines (tusks) was measured using digital calipers, expressed in centimeters. The degree of dental wear was evaluated macroscopically and categorized as absent, slight, moderate, or pronounced, according to the condition of premolars, molars, and tusk apices [2].

Tongue Morphology

Tongues were dissected and measured (tip to root) with precision rulers. Dimensions were recorded in centimeters. The distribution and morphology of lingual papillae (filiform, fungiform, and circumvallate) were examined macroscopically, and observations regarding density, keratinization, and developmental stage were documented.

Data Recording and Presentation

For each specimen, a standardized datasheet was compiled including: date of harvest, sex, age class, season, tusk measurements, dental wear, tongue length, and papilla morphology. Results were summarized in tables for each hunting ground (Dagâța and Strunga) to facilitate comparative analysis.

## RESULTS

All examined wild boar individuals presented the complete permanent dental formula characteristic of suids (I 3/3, C 1/1, P 4/4, M 3/3 = 44 teeth). Marked differences were observed according to sex, age, and hunting ground. In adult males, the tusks were strongly developed, dorsally and laterally curved, reaching lengths between 19.1 and 20.7 cm in Dagâța, while in Strunga specimens the values were slightly higher, ranging from 21.5 to 22.1 cm. Adult females exhibited significantly shorter and thinner tusks, between 8.9 and 9.4 cm in Dagâța and between 9.1 and 10.1 cm in Strunga. Juveniles showed incompletely erupted tusks, measuring only 4.2 to 6.3 cm in Dagâța and 4.5 to 6.7 cm in Strunga. Dental wear was absent in juvenile individuals, slight to moderate in adults from Dagâța, and more pronounced in adults from Strunga,

particularly in the molars, suggesting the influence of a harder and more abrasive diet.

The analysis of tongue morphology revealed consistent differences linked to sex and age. Adult males had the largest tongues, with lengths ranging from 24.7 to 25.3 cm in Dagâța and 24.6 to 26.0 cm in Strunga. Adult females had shorter tongues, measuring 22.1 to 22.9 cm in Dagâța and 22.5 to 23.5 cm in Strunga. Juveniles exhibited smaller tongues, between 17.8 and 18.6 cm in Dagâța and 17.6 to 19.2 cm in Strunga. The three major types of papillae—filiform, fungiform, and circumvallate—were identified in all cases. In adult males, the filiform papillae were dense and occasionally showed slight apical keratinization, particularly in Strunga. Adult females presented a uniform distribution of papillae, although in some cases the fungiform papillae appeared flattened or slightly atrophied. In juveniles, papillae were still developing, and circumvallate papillae were less pronounced.

Comparative analysis between the two hunting grounds highlighted both ecological and anatomical variations. Strunga specimens generally showed longer tusks and more advanced dental wear, which could indicate a diet with harder or mineral-rich components. By contrast, Dagâța individuals exhibited slightly shorter tongue dimensions but less pronounced dental abrasion. Overall, the results confirm a clear sexual dimorphism, with males displaying more robust dentition and larger tongue size than females, while age-related differences were evident in the degree of dental wear, tusk development, and papillary maturation.

## DISCUSSIONS

The morpho-structural and anatomical characteristics observed in the present study confirm the presence of clear sexual dimorphism and ontogenetic variation in wild boar (Sus scrofa), while also highlighting subtle ecological differences between hunting grounds. Dentition proved to be one of the most reliable markers of both sex and age. Adult males developed large and robust tusks, which function not only as feeding tools but also as weapons in intraspecific combat and as indicators of social dominance. The tusk measurements obtained in this study are consistent with ranges reported in other European populations, reinforcing the role of tusks as secondary sexual characters. In contrast, females presented much smaller and less curved canines, reflecting their reduced involvement in aggressive encounters and the absence of selective pressures favoring tusk development. Juveniles, as expected, showed incomplete dentition and minimal wear, consistent with their developmental stage.

The degree of dental wear differed between hunting grounds, being more pronounced in Strunga than in Dagâța. This variation likely reflects differences in feeding ecology, with Strunga individuals being exposed to harder or more mineral-rich foraging substrates. Similar associations between habitat composition and dental wear have been documented in other ungulates, supporting the idea that dentition can serve as an ecological indicator of diet quality and habitat conditions [4, 9].

Analysis of the tongue morphology further emphasized sexual and age-related differences. Adult males exhibited longer tongues, with dense filiform papillae and signs of slight apical keratinization. This keratinization may represent an adaptive response to the mechanical demands of consuming coarse or abrasive forage. Females, while displaying generally well-distributed papillae, sometimes showed flattened fungiform papillae, which could be related to diet or age-associated atrophy. Juveniles presented tongues of smaller dimensions, with underdeveloped circumvallate papillae, reflecting their immature physiological state.

From a functional perspective, the observed differences have important ecological and adaptive implications. Dental and lingual characteristics together influence the efficiency of food intake, mastication, and taste perception. Sexual dimorphism in tusks underscores the role of males in competition for mates, while tongue morphology provides insights into the adaptation of the species to diverse diets and habitats. The combined analysis of these structures thus contributes to a more comprehensive understanding of the biology and ecology of wild boar populations [6].

Finally, the comparison between Dagâța and Strunga demonstrates that ecological conditions shape anatomical traits. Longer tusks and more pronounced dental wear in Strunga suggest higher mechanical demands associated with the local diet, while Dagâța individuals exhibited less abrasion but slightly shorter tongue measurements. Such findings highlight the necessity of considering local habitat factors in morphological studies, as they provide critical information for wildlife management and conservation strategies [5, 7, 8].

Table 1 Comparative Results of Dentition and Tongue Morphology in Wild Boar (*Sus scrofa ferus*)

| Category | Dagâța (n=6) | Strunga (n=6) |
|---|---|---|
| Dental Formula | I 3/3, C 1/1, P 4/4, M 3/3 (44 teeth) | I 3/3, C 1/1, P 4/4, M 3/3 (44 teeth) |
| Tusks – Adult Males | 19.1–20.7 cm; curved, robust | 21.5–22.1 cm; longer, robust, curved |
| Tusks – Adult Females | 8.9–9.4 cm; gracile, thin | 9.1–10.1 cm; thin, slightly longer |
| Tusks – Juveniles | 4.2–6.3 cm; incomplete eruption | 4.5–6.7 cm; incomplete eruption |
| Dental Wear | Slight to moderate in adults; absent in juveniles | More pronounced in adults, especially molars; absent in juveniles |
| Tongue Length – Adult Males | 24.7–25.3 cm | 24.6–26.0 cm |
| Tongue Length – Adult Females | 22.1–22.9 cm | 22.5–23.5 cm |
| Tongue Length – Juveniles | 17.8–18.6 cm | 17.6–19.2 cm |
| Papillae – Adult Males | Dense filiform papillae; slight apical keratinization | Dense filiform papillae; stronger keratinization |
| Papillae – Adult Females | Well distributed; some flattened fungiform papillae | Well distributed; occasional atrophy of fungiform papillae |
| Papillae – Juveniles | Developing papillae; circumvallate weakly developed | Developing papillae; circumvallate in formation |

n-number of specimens analyzed

## CONCLUSIONS

The present study highlights the presence of clear morpho-structural and anatomical differences in wild boar (Sus scrofa), influenced by sex, age, and ecological conditions. All specimens displayed the complete suid dental formula, yet pronounced sexual dimorphism was observed in tusk development, with adult males exhibiting significantly longer and more robust tusks than females. Age-related differences were equally evident, as juveniles showed incomplete dentition, reduced tongue size, and underdeveloped papillae, while adults demonstrated fully erupted dentition, larger tongues, and variable degrees of wear.

Comparative analysis between the two hunting grounds emphasized the role of local ecological conditions. Specimens from Strunga presented longer tusks and more advanced dental wear, suggesting a diet with harder or mineral-rich forage, whereas Dagâța individuals displayed less abrasion but slightly shorter tongue measurements. These findings support the view that habitat quality and food availability directly influence cranio-dental and lingual morphology.

From a broader perspective, the study demonstrates that dentition and tongue morphology are valuable indicators not only of age and sex, but also of ecological adaptation. Integrating such morpho-anatomical analyses into wildlife monitoring can provide useful tools for sustainable game management and for understanding the adaptive strategies of wild boar populations.

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