



General and morphological characteristics of the wild boar (*Sus scrofa*) - a retrospective study

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Abstract. The wild boar (*Sus scrofa*) is characterized by a set of complex adaptive characteristics to the wild environment. The natural habitat shaped the morpho-functional skills, therefore it presented a well-developed trunk, flattened laterally, robust, clothed in musculature, covered with long and rough dark-colored hairs, with a heat-insulating role. The skull is elongated with a large diameter, and the nose ends in the form of a mobile, wet disc, on which two external nostrils are present. Strongly developed olfactory system and auditory system, which helps to detect food and survive. Prominent fangs can be considered distinctive elements, which can have considerable dimensions, especially in the case of males.

Key Words: habitat, morphological characteristics, physical characteristics, wild pig.

Introduction. Currently, according to data available in the specialized literature, the wild boar (*Sus scrofa*) is one of the most discussed large mammals by people in Europe, the main reason being their constant and rapid reproduction in recent decades (Massei et al 2015; Drimaj et al 2019).

According to data from the specialized literature, wild boar is part of the Suidae family, the Artiodactyla order, the Mammalia class, the Chordata phylum and the Animalia kingdom. Wild boars can be found in many areas worldwide, in the non-polar regions. The species *Sus scrofa* includes the Eurasian wild boar, wild pigs of domestic origin, and hybrids between wild and domesticated pigs (Apollonio et al 1988; Melis et al 2006).

The wild boar is considered a cosmopolitan species, with origins in Europe and Asia, but was introduced by humans in North America, being considered an invasive species in the S-E United States and California at the same time. It is found on every continent except Antarctica (Ickes et al 2001; Melis et al 2006).

The wild boar is largely widespread so that we can meet it in several habitats (grassy savanna areas, wooded forests, agricultural areas, areas with shrubs, marshy areas), avoid extreme heat and cold (Millar & Zammuto 1983; Montowska et al 2024).

The wild boar needs a source of water nearby and dense vegetation, so that in places where there are high winter temperatures and snow is maintained and the ground is frozen, it does not have the opportunity to look for roots or foliage, therefore in such places the number of specimens decreases (Ickes & Williamson 2000; Ickes et al 2001).

It is confirmed, the hypothesis of "wild pest" or "destructive species" in several specialized studies, due to the damage it causes to various agricultural crops, it is an animal that usually looks for food at night to avoid being exposed to the dangers around, but it can be active during the day, if there is no danger in (Melis et al 2006; Drake et al 2008). In Romania, the wild boar is largely widespread with a higher density in the hilly area, it prefers hilly and plain areas with deciduous or conifer forests, the soil should preferably be moist and close to agricultural land. The wild boar lives in herds united in

well-established social relationships (Cocor et al 2022). According to Cocor et al (2022), the wild boar is considered a forest animal, but we can also meet it in the natural channels of the Danube Delta.

The wild boar is considered a species that adapts easily but is also opportunistic, so the population dynamics can be influenced by several factors, including: climate, food, other animals for which it is a food source, humans through hunting activity, and parasitic or infectious diseases (Markov et al 2019). According to studies in the specialty literature, the wild boar is considered one of the species whose geographical distribution area has expanded greatly naturally but also due to human intervention (Mainali et al 2015; Markov et al 2019).

The main conflicts that wild boar have with human society are due to damage to agricultural crops, negative effects on environmental diversity and the spread of parasites, African swine fever or the hepatitis E virus (Braga et al 2010; Carpentier et al 2012; Drimaj et al 2019).

Description of the wild boar. The wild boar is an opportunistic, monogastric, ungulate, omnivorous species, with a negative impact on agricultural crops and animal fauna due to food competition, the spread of parasitic and infectious diseases, habitat destruction, and direct attack on smaller species of animals (Massei & Genov 2004; Allwin et al 2016). It presents a pronounced sexual dimorphism, with clear differences between males and females at maturity, therefore males are approximately 5-10% larger than females and 20-30% heavier compared to females, these differences are not noticeable in the subadult stage (Pedone et al 1995; Butler et al 2005; Allwin et al 2015; Morelle et al 2016).

A large percentage of the population consumes wild boar meat, due to its organoleptic and sensory characteristics, thus opening up a new agro-tourism activity with beneficial potential for those involved and consumers. Worldwide, wild boar is raised through various practices because it is an animal that adapts very easily (Bieber & Ruf 2005).

There are three main systems for raising wild boars: semi-extensive, where the wild boar has access to pasture and is given a supplementary nutritional diet; semi-intensive, where the surface area per animal is smaller compared to the extensive system; hunting grounds, which are the most common in Europe, hunting being the main source of wild boar meat (Fernández-Llario 2004; Allwin et al 2016).

General physical characteristics. The wild boar is a robust animal, being characterized by a strong trunk, with flattened sides, more rounded in the scapular region and wider in the hips, the fore and hind limbs are short and thin, and each foot has four toes. The length of a male specimen is approximately 2 meters, respectively 1.5 meters for females. After a winter season in which it does not benefit from the necessary food, the weight of a boar can decrease up to 50-70% of its weight in the autumn season. The lateral fingers are shorter and positioned higher compared to the central peg, they are covered by keratinized hooves, supported by fleshy plates on the posterior ventral surface of each finger. The tail is short, being covered with hair especially towards its tip, and its shape can vary from straight to wavy. The skull has an elongated shape with a large diameter, supported by a short neck, some specimens of wild boar show a developed mane along the neck. The eyes are small in size and the ears are characterized as relatively wider structures that gradually taper to a point towards the tip. Regarding the general aspect of the conformation of adult wild boars, males show a general profile of the scapular region that is more angular compared to females, the skull of males is larger compared to the skull of females. Adult males present at the level of oral cavities, enlarged canines that protrude visibly from the oral cavity and are prominent compared to adult females. Adult females have visible mammary glands. The piglets' body has a brown-yellow color (Graves 1984; Herrero et al 2004; Larson et al 2005; Bywater et al 2010; Dyce et al 2010; Barosa et al 2014).

As for the color of the boar's hair, it can vary between dark brown (summer season) and almost black (winter season). Numerous authors present the hair as "big

and rough", it should be specified that the "visible" spiky, rigid, long, smooth hairs are doubled during the cold season by a second layer of hair, with dense, fine and wavy hairs (Allwin et al 2016).

The wild boar is an omnivorous animal, its food is made up of approximately 85% vegetables and approximately 15% animal food, which consists of small mammals and other animal carcasses (Schley & Roper 2003; Herrero et al 2004; De Magalhaes & Costa 2009).

Morphological characteristics. According to data from the specialized literature, the skeletal system of the wild pig is similar to that of the domestic pig from a morphological point of view, with some taxonomic differences being mentioned, for example the length of the long bones. In wild pigs, bones such as the humerus and femur have a smaller diameter and length compared to domestic pigs, in this case an influencing factor may be nutrition that is inferior to that provided in the case of domestic pigs (Saez-Royuela & Telleria 1986; Lösel et al 2013; Lossi et al 2016).

Skull. Skull on general inspection examination is elongated, especially towards the rostral side, the general shape of the skull being triangular in ventral, dorsal and lateral aspect. The skull ends posteriorly in an occipital crest; the orbits are small. The mass of the skull of a wild pig can reach a percentage of 7-10% of the total body mass, according to a study by Stribling (1978). The skull is more developed compared to the domestic pig (Lossi et al 2016).

Teeth. In both female and male wild boars, the number of permanent teeth is 44. Studies confirm that many dental anomalies and deformations have been described over time (Magnell & Carter 2007). The dental formula for permanent teeth is as follows: I 3/3, C 1/1, P 4/4, M 3/3. According to the data from the specialized literature, in the case of permanent teeth, the three upper incisors are spatulate with a deep convex shape. The diameter of the crowns decreases as the teeth narrow towards the root, and a diastema is present between the last upper incisor and the canine. The lower incisors are in the form of rods and are only slightly curved, they are aligned and placed closely together. The size of both the lower and upper incisors decreases from medial to lateral teeth. Nutrition can influence the age of eruption, so the higher the level of nutrition, the earlier the eruption of these teeth is according to studies (McCance et al 1968). Studies show sexual dimorphism of the canines or permanent teeth of males, which are significantly larger than those of females (Amon 1938; McCance et al 1968; Andrzejewski 1974).

Postcranium skeleton. The wild boar has a number of vertebrae between 50 and 55, this variation being common to both sexes of these species, without dimorphic differences. The number of vertebrae has been established to vary depending on the region: cervical region: 7 vertebrae, thoracic region: 13-16 vertebrae; lumbar region: 5-7 vertebrae, sacral region: 4 vertebrae and caudal region: 20-26 (Mayer et al 1991; Hildebrand & Goslow 2006). This variability in the number of vertebrae may be a combination of natural variability and variability given by artificial selection under the process of domestication. Therefore this variation in the number of vertebrae produces, in turn, differences in body length. In accordance with the variation in the vertebrae, the number of ribs may also vary from 13 to 17 ribs (Mayer et al 1991; Grosbois et al 2008). Studies over time have demonstrated various skeletal deformations in the forelimbs and hindlimbs of wild pigs (Stribling 1978; Mayer et al 1991; Hildebrand & Goslow 2006).

Total body mass. Intact weight without removal of internal organs is a highly variable parameter. According to statistics, wild boar has a high potential to reach large body masses (Bergqvist et al 2018).

Skin. The surface of the skin is relatively smooth, in certain regions of the body it may be thicker, for example in the area of the lips and muzzle or between the toes. A study by Stribling (1978) determined that skin and hair represent 17.5% of the total body mass of

a wild boar. According to the study conducted by Wada et al (2025), where the authors examined the histological structure of the skin of wild boars from Timor Island, aged between 5-6 months, the site of skin sampling being: the lumbo-dorsal region, the abdominal region and the intersaccular region. The results of the study confirmed that wild boar skin is made up of three layers (epidermis, dermis and hypodermis), and the epidermis in turn is made up of four structures (basal layer, spinous layer, granular layer and corneous layer). The second layer, the dermis, includes the dermal papilla and the reticular dermis, formed by dense connective tissue containing collagen fibers and elastic fibers. Also in the dermis, primary hair follicles, sebaceous glands, erector pili muscles and blood vessels were observed. The last layer, the hypodermis, is made up of loose connective tissue with abundant fat cells, where secondary hair follicles and sweat glands are located (Wada et al 2025).

Reproductive system. Drimaj et al (2019) evaluated the onset of sexual maturity, of the reproductive system (testicles and sperm quality) in wild boars depending on several factors (age, physical constitution, environmental conditions). Therefore, environmental conditions have proven to be an important factor for the growth and sexual maturity of male wild boars, so that in a quality environment, they develop faster and reach puberty at a younger age. Food shortage or hunting them, slows down the development of the reproductive system, approximately 2-3 months.

Wild boar reproductive activity is seasonal and is regulated by photoperiodicity, therefore it can be stated that most females reproduce during the primary reproductive season, from November to March (Imaizumi & Chabata 1977; Orłowska et al 2013). The average pregnancy rate is $33.4 \pm 1.94\%$ (mean \pm SE), while the average litter size per pregnant female is 4.7 ± 0.12 . The highest pregnancy rate is during the peak of seasonal reproduction (winter and spring). Therefore, the probability of a female being pregnant exceeded 50% when the carcass weight exceeded 58 kg, equivalent to a live weight of 113 kg. No significant effects of climate on reproduction were identified (Gascon et al 2000; Wilcox & Van Vuren 2009; Bergqvist et al 2018).

Teat count. The teats of wild boars are similar to those of domestic pigs. In terms of the location of the teats, they extend from the thoracic region to the inguinal region, they are usually arranged in pairs as follows: 1-2 inguinal pairs, 2-3 abdominal pairs and 2 thoracic pairs. There are situations in which staggered arrangements or supernumerary teats occur, resulting in an odd number of total teats for any individual. As a rule, the number of teats in wild boars can vary, the number of teats increasing from the Eurasian wild boar to hybrid pigs, wild boars and domestic pigs (Pedone et al 1995; Pastick 2012; Pereira et al 2016).

Internal organs. Morphologically, the internal organs of wild boars show significant similarities with the domestic pig. The differences that appear from an anatomical point of view are influenced by lifestyle, also called adaptive differences (Mayer & Brisbin 1991; Lösel et al 2013).

Cardiovascular system. According to Damian (2001), the cardiovascular system is formed by an essential, pulsatile organ, which plays the role of a suction-repelling pump called the heart, and a network of blood vessels (blood) and lymphatic vessels (lymph). From a morphological point of view, the heart is described as a cavitory, muscular organ that contracts and ensures the propulsion of blood throughout the animal body. Its location is in the thoracic cavity (Cardiac Mediastinum), it is less deviated to the left, globular, with the longitudinal axis more inclined towards the sternum (Damian 2001). The right atrium is smaller compared to the left one, which also has scalloped edges (Damian 2001). The structure of the heart includes the following formations: fibrous tissue, cardiac striated muscle tissue (myocardium), embryonic muscle tissue, cardiac endothelium (endocardium), its own blood vessels and sympathetic and parasympathetic nerve fibers (Miclaus 1998). The wild boar heart weighs between 400 and 600 g, and unborn wild piglets have a heart that can weigh approximately 9 g, compared to adult domestic pigs

which have a heart weight between 240 and 500 g (Mayer & Brisbin 1991; Cabral et al 2001). Intramyocardial connective tissue is reduced in wild pigs compared to domestic pigs (Mayer & Brisbin 1991).

The spleen is an odd-shaped organ that is part of the circulatory system, and in pigs it is reddish-brown in color, elongated, approximately 30-60 cm long and approximately 5-10 cm wide, with slightly pointed extremities that give it a "lance" appearance. The spleen can generally weigh between 100-300 g, being affected by the age and size of the animal (Mayer & Brisbin 1991; Damian 2001).

Respiratory system. The respiratory system in pigs consists of a set of organs that carry out gas exchange between the body and the environment (Popovici et al 2003). The lungs play the most important role, being considered specialized respiratory organs, due to the gas exchange they perform between air and blood, specifying that gas exchange can be performed at two levels: pulmonary or external and tissue or internal, that is, at the level of cells in the body (Popovici et al 2003). The two lungs are paired organs located in the thoracic cavity, occupying most of it. The color of the lungs is pale pink, with lobulation highlighted (Popovici et al 2003).

Cabral et al (2001) found in their study that the right lung was divided into 4 lobes, and the left was divided into 2 lobes. Regarding the weight of the lungs in adult wild boars, it is approximately 900-1400 g, and in unborn young we have a weight of approximately 30 g (Stribling 1978). The four lobes of the right lung are: cranial, caudal, middle and accessory-azygos. It is worth mentioning that the left lung has a reduced cranial lobe (Popovici et al 2003). The air-conducting organs are represented by the nasal cavities, pharynx, larynx, trachea and bronchi (Popovici et al 2003).

In pigs, the nostrils are generally small, circular, symmetrical, and appear as two openings on the flat surface of the snout. The snout serves as a tactile organ but also for rowing, with obvious mobility. The regional skin is thick with fine and short hairs. The skin is continuous with the nasal mucosa but without presenting a clear demarcation. Regarding the opening of the lacrimonasal canal, it is located aborally. In pigs, the paranasal sinuses are multiple, therefore each paranasal bone has a sinus. Thus, the cranial box is surrounded by large pneumatic spaces, here there may be variations depending on the species, individual or even age (Mayer & Brisbin 1991; Popovici et al 2003).

In pigs, the larynx is long, reaching up to the 5th cervical vertebra, acting as a metering organ for the air entering or leaving the lungs. In the case of the trachea, which is also a conducting organ for exhaled air, its length is proportional to the animal's height, for example, in an adult pig it is 25-30 cm long and can contain between 30 and 36 cartilaginous rings. The trachea has an almost circular lumen, and the extremities of the rings are overlapping. The right and left bronchi result from the terminal bifurcation of the trachea (Mayer & Brisbin 1991; Popovici et al 2003; Carvalho et al 2006; Dyce et al 2010).

Digestive system. In pigs, the esophagus is 35-45 cm long, depending on the size of the animal, with an almost uniform caliber. The stomach is presented by a postdiaphragmatic dilation, in continuation of the esophagus-cardia orifice and continues with the small intestine-pyloric orifice (Popovici et al 2003). The capacity of the stomach can vary, but on average it is somewhere around 4-8 liters depending on size and age but can even reach 101 liters in the domestic pig (Popovici et al 2003; Pinna et al 2007). The peculiarity of the stomach in pigs is curved shape on itself, with the presence of an obvious angular incision, with a neck appearance that divides the stomach into two parts: the gastric cavity segment and the pyloric segment (Popovici et al 2003). The gastric diverticulum is a globular dilation that is located in the fundic part of the stomach. The intestine in an adult medium-sized pig, in general, is 22-26 meters long, of which approximately 16-21 meters belong to the small intestine and only 4-6 meters belong to the large intestine (Popovici et al 2003). The small intestine includes the duodenum, jejunum and ileum while the large intestine includes the cecum, ascending colon, transverse colon, descending colon, ending with the rectum and anal canal (Popovici et al

2003). The liver is relatively large and divided into four main lobes; its average weight in an adult wild boar is approximately 1600-2000 g. The liver of young animals weighs approximately 36 g (Mayer & Brisbin 1991; Popovici et al 2003). The liver is considered the largest gland in the body, being located in the abdominal cavity, attached to the diaphragm muscle. The liver is a mixed gland with multiple roles. Bile is the external secretion of the gland, which reaches the intestine through the intrahepatic and extrahepatic ducts. In the case of the study of the liver, a diaphragmatic/parietal surface, a visceral surface, an upper border, a lower border and two extremities are observed. The color of this organ is red-brown sometimes towards violet. The Glisson capsule is fibrous and transparent, and due to these characteristics the outline of the lobes can be observed, an appearance given by the interlobular connective lamellae which are thick. Six lobes are described (right lateral, right medial, quadrate, left lateral, left medial and the accessory Spigelian lobe) (Popovici et al 2003). The individualization of these lobes of the liver is very evident on the visceral side of the organ. The pancreas is the second gland attached to the digestive tract, and in pigs, the pancreas of an adult animal weighs approximately 100-150 g. It is irregularly shaped with two lobes, the right lobe and the left lobe (Popovici et al 2003; Geisser & Reyer 2004; Elston & Hewitt 2010; Carpentier et al 2012; Santos et al 2013).

Urinary system. The kidneys in pigs have a smooth surface, the color is reddish-brown or yellowish brown in pigs that have died after slaughter due to blood loss. The kidney can have an average weight of approximately 150-200 g. According to the topography, in most cases the left kidney is located more cranially than the right one. The medulla is arranged in multiple "Malpighi" pyramids, which gives the kidney a multipapillary character (Zimmer 1930; Popovici et al 2003).

Muscular system. Bogucka et al (2008) compared the histological structure of muscles from wild boars, domestic pigs, and their hybrids. Thus, the highest proportion of slow- and fast-twitch oxidative fibers was in wild boar muscles compared to wild boars or their hybrids, where there was a decrease in the percentage of oxidative fibers and an increase in the percentage of glycolytic fibers.

Conclusions. In this analysis, we tried to gather as much main information as possible regarding morphology, studies confirming that the wild boar is very similar to the domestic pig, information about behavioral, reproductive and zoological aspects.

Conflict of interest. The authors declare that there is no conflict of interest.

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