



Genetic pioneers: Exploring the evolutionary tapestry and future frontiers of porcine genetics

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Unlocking the mysteries of porcine genetics. Exploring the fascinating world of pigs. Pigs, known scientifically as *Sus scrofa domesticus* or *Sus domesticus*, have long been an integral part of human civilization (Petrescu-Mag & Oroian 2018). From being a staple in cuisines across the globe to serving as subjects for scientific research, pigs hold a unique position in our society (Proorocu et al 2021). However, it is not just their succulent meat that makes them remarkable; it is their genetics and evolution that unveil a captivating narrative of adaptation, diversity, and scientific exploration.

Evolutionary marvels: from wild boars to domesticated companions. The domestic pig is believed to have descended from the wild boar and originated in Southeast Asia over ten thousand years ago (Lander et al 2020; Price & Hongo 2020). Through a process of domestication spanning millennia, humans have selectively bred pigs to suit their various needs, resulting in an astonishing array of shapes, sizes, and characteristics (Petrescu-Mag et al 2020).

Pigs possess a remarkable ability to adapt to diverse environments, a trait that has been honed through both natural selection and human intervention. From the densely forested regions of Europe to the arid plains of Africa, pigs have thrived in a multitude of habitats, showcasing their resilience and versatility (Frantz et al 2016).

Genetic diversity: The key to adaptation and innovation. The genetic diversity present within pig populations is staggering. This diversity not only reflects the evolutionary history of pigs but also serves as a reservoir of genetic potential for future breeding programs and scientific research (Oroian & Petrescu-Mag 2014) (see a rustic pig breed in Figures 1-2).

One area of particular interest is disease resistance (Botha et al 2020). Pigs are susceptible to a wide range of pathogens, including viruses, bacteria, and parasites. Understanding the genetic basis of disease resistance in pigs could lead to the development of more resilient breeds, thereby reducing the need for antibiotics and improving overall animal welfare.

Furthermore, pig genetics play a crucial role in meat quality and production efficiency. Through selective breeding, researchers aim to enhance traits such as meat tenderness, marbling, and growth rate, ultimately leading to more flavorful and sustainable pork products (Wang et al 2023).

Cutting-Edge research: Unraveling the genetic code of pigs. Recent advancements in genomic technology have revolutionized our understanding of pig genetics. The mapping of the pig genome has provided researchers with invaluable insights into the genetic basis of various traits (Pan et al 2021), paving the way for more targeted breeding strategies and precision agriculture.

Moreover, ongoing research efforts are focused on utilizing gene editing techniques such as CRISPR-Cas9 to introduce beneficial traits into pig populations (Zhang et al 2021; Tanihara et al 2021). These advancements hold the potential to revolutionize agriculture by creating pigs that are not only more resilient to disease but also more environmentally sustainable.



Figure 1. Blonde Mangalitsa breeding boar (Photo 60492006 | Mangalitsa © Goldikan | Dreamstime.com).



Figure 2. Blonde Mangalitsa breeding sow (Photo 60503397 | Mangalitsa © Goldikan | Dreamstime.com).

Conclusion. The future of porcine genetics. Pigs and their genetics are a source of endless fascination and potential. From their evolutionary journey as wild boars to their domesticated roles as companions and food sources, pigs have captivated human interest for millennia. As we continue to unravel the mysteries of porcine genetics, we unlock new opportunities for innovation in agriculture, medicine, and beyond. By harnessing the power of genetic diversity and cutting-edge research, we can ensure a brighter and more sustainable future for both pigs and humanity alike.

Conflict of interest. The author declares that there is no conflict of interest.

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