

Short communication

First documented observation of differential dorsoventral coat colouration in wild boar *Sus scrofa* (Artyodactyla: Suidae) in Italy

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Abstract - Wild boar *Sus scrofa* usually shows a uniform brown coat, but different colour patterns have been observed with red, brown, black, and white morphs. Nevertheless, coat colour polymorphism is often associated with hybridization with domestic pigs. The melanocortin-1 receptor (MC1R) gene and the agouti (ASIP) gene are the most studied genes involved in pigmentation in mammals. Particularly, mutations in the ASIP locus are responsible for a differential dorsoventral colouration. Polymorphisms in at least one of these two loci have been detected in all domestic breeds in Europe, while wild-type genotypes have almost exclusively been identified in wild boar. Therefore, coat colour polymorphism and MC1R/ASIP mutations are often used to detect wild/domestic hybrids. Here, the first documented observation of differential dorsoventral coat colouration in *Sus scrofa* in the wild is reported in a juvenile in Abruzzo National Park (Italy), raising some concerns about possible wild boar x domestic pig hybridization in this protected area.

Key words: Abruzzo National Park, agouti gene, coat pattern, hybridization, wild boar.

Riassunto - Prima osservazione documentata in Italia di una colorazione a demarcazione dorsoventrale nel cinghiale *Sus scrofa* (Artyodactyla: Suidae).

Il cinghiale *Sus scrofa* presenta solitamente una colorazione marrone uniforme ma sono stati osservati diversi pattern cromatici con varianti rosse, marroni, nere e bianche. Tuttavia, tale variabilità è spesso associata all'ibridazione con maiali domestici. A tal proposito, i geni agouti (ASIP) e del recettore melanocortina-1 (MC1R) sono i più studiati tra quelli coinvolti nella pigmentazione dei mammiferi. In particolare, mutazioni del locus ASIP portano ad una colorazione non uniforme secondo una demarcazione dorsoventrale. Polimorfismi in almeno uno dei due loci sopracitati sono stati riscontrati in tutte le razze di maiali allevate in Europa e, pertanto, la presenza di polimorfismi nel pattern cromatico e in MC1R/ASIP sono frequentemente usati per l'identificazione degli ibridi tra cinghiali e maiali. In questa nota, viene

riportata la prima osservazione documentata di un giovane esemplare di cinghiale con colorazione a demarcazione dorsoventrale nel parco nazionale d'Abruzzo, destando qualche preoccupazione sulla possibile presenza di ibridi all'interno di quest'area protetta.

Parole chiave: cinghiale, gene agouti, ibridazione, parco nazionale d'Abruzzo, pattern cromatico.

The wild boar *Sus scrofa* is among the most common mammal species in the Palearctic with a distribution range spanning from Western Europe and part of North Africa to South-East Asia, and it has also been introduced to the Americas and Oceania (Oliver *et al.*, 1993).

Wild boar usually shows a uniform brown coat, but different colour patterns have been observed with red, brown, black, and white morphs (Yang *et al.*, 2018). This polymorphism is often associated with hybridization with domestic pigs which have been under selection by humans to produce a great variety of coat colours depending on different needs and cultural preferences (Larson & Burger, 2013). Pigmentation in mammals is known to be influenced by hundreds of genes (Baxter *et al.*, 2019). Among these, the melanocortin-1 receptor (MC1R) gene and the agouti (ASIP) gene are the most studied and probably the most relevant ones in wild and domestic pigs (Lu *et al.*, 1994; Siracusa, 1994; Fajardo *et al.*, 2008; Fang *et al.*, 2009; Canu *et al.*, 2016; Fulgione *et al.*, 2016). Particularly, mutations in the ASIP locus are responsible for a differential dorsoventral colouration (Vrieling *et al.*, 1994). Genetic polymorphism in at least one of these two loci has been detected in all domestic breeds in Europe, while wild-type genotypes have almost exclusively been identified in wild boar (Fang *et al.*, 2009). Therefore, coat colour polymorphism and MC1R/ASIP mutations have been used to detect wild/domestic hybrids (Koutsogianouli *et al.*, 2010; Frantz *et al.*, 2013; Fontanesi *et al.*, 2014).

Even though the wild boar is a widespread and very abundant species across Italy and its management is a major issue especially in urban areas, there is very poor knowledge about the distribution and frequency of hybrid-like phenotypes in the country (Battocchio *et al.*, 2017; Lorenzini *et al.*, 2020; Petrelli *et al.*, 2022). In this note, the first documented observation of a differential dorsoventral coat colour pattern in Italy is reported.

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Fig. 1 - The juvenile wild boar object of this note showing the differential dorsoventral colouration pattern (right) next another wild-type individual (left). Additional footage available at: <https://youtu.be/gTc0BFSE9kA>. / Il giovane esemplare di cinghiale oggetto di questa nota in cui è visibile il pattern cromatico a demarcazione dorsoventrale (a destra) accanto a un altro individuo con la tipica colorazione marrone uniforme (a sinistra). È anche disponibile un filmato aggiuntivo: <https://youtu.be/gTc0BFSE9kA>. (Photo and video: / Foto e video: Francesco Gallozzi).

The sighting occurred on 24 August 2023 at 7:14 pm in Abruzzo National Park, Italy (41.785 N, 13.807 E; elevation 1120 m). The author was observing a wild boar group of about 50 individuals foraging at dusk in the large plain between the villages of Pescasseroli and Opi. All the animals in the group showed a typical uniform brown coat colour, except for a juvenile showing a well distinct colour pattern with black back and white belly and showing a clear dorsoventral demarcation (Fig. 1).

This pattern had never been documented in Italy to date (Scandura and Mori, personal communication) and, to the best of the author's knowledge, this is arguably the first photo-vouchered observation of this phenotype of *Sus scrofa* in the wild. As already mentioned before, coat colour polymorphism may indicate wild boar × domestic pig hybridization. Given that this observation occurred in one of the most extended national parks in Italy, this may raise some concerns about wild boar's management and conservation. As a matter of fact, genetic purity of a wild species is always desirable, since hybridization between wild individuals and their domestic counterparts can have unpredictable evolutionary and behavioural consequences often leading to a decrease in fitness (Frantz *et al.*, 2013; Fulgione *et al.*, 2016; Battocchio *et al.*, 2017). The potential presence of hybrids also raises some concerns about wildlife interactions with domestic animals living in the inhabited areas of the park. The avoidance of contact between wild boar and domestic pigs is crucial to prevent disease transmission and human-wildlife conflicts. Anyway, genetic analyses are needed to detect the presence of actual hybridization, and a survey of the *Sus scrofa* population living in Abruzzo National Park is therefore highly suggested.

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