

Genetic diversity and population structure analysis of Philippine native pigs highlights four priority populations for conservation

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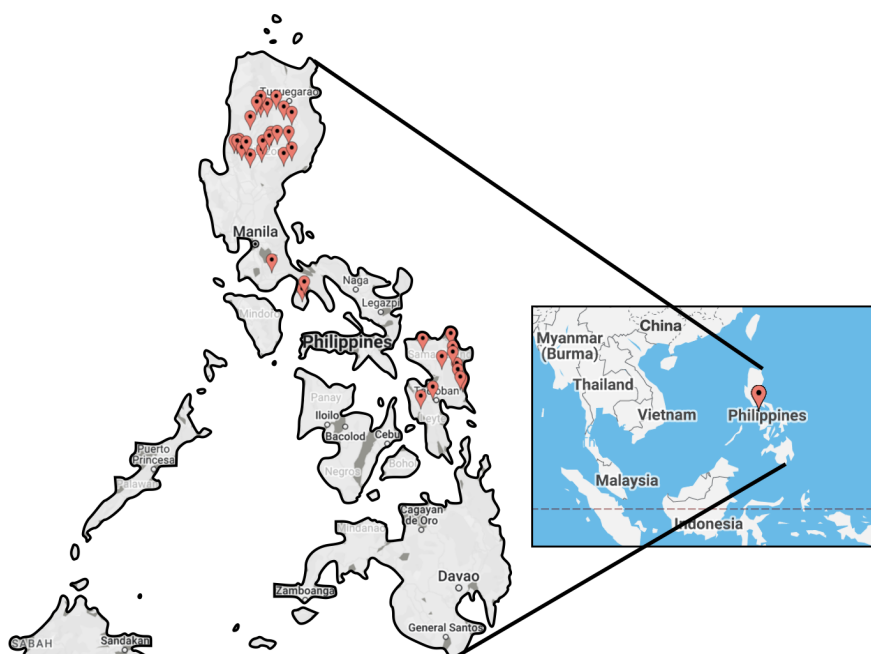
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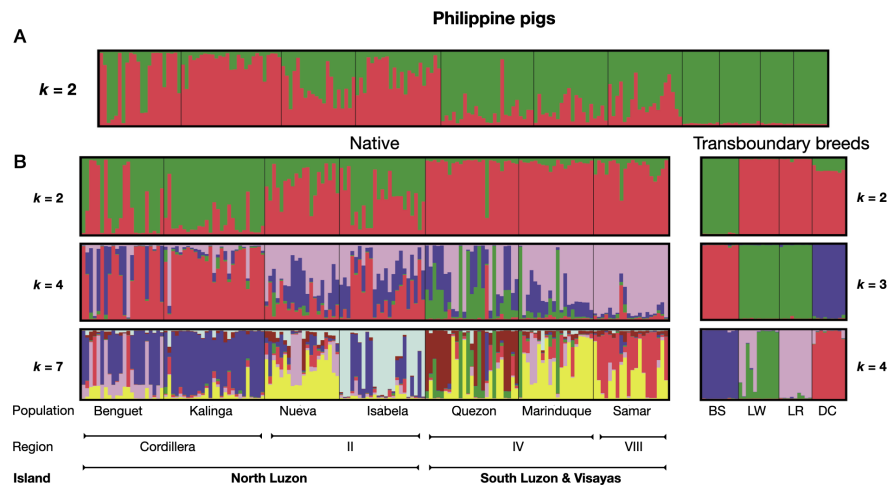
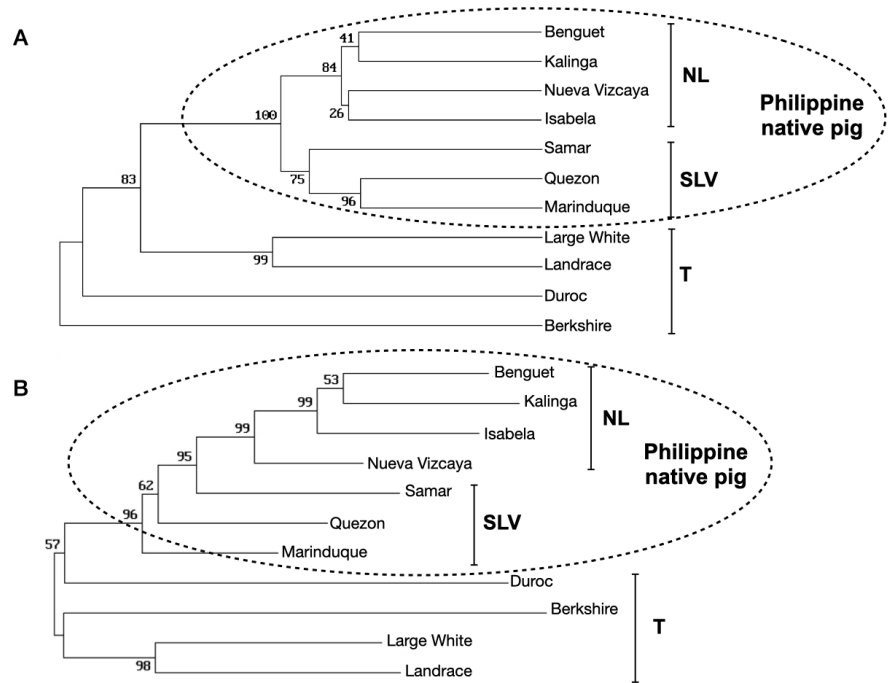
Abstract

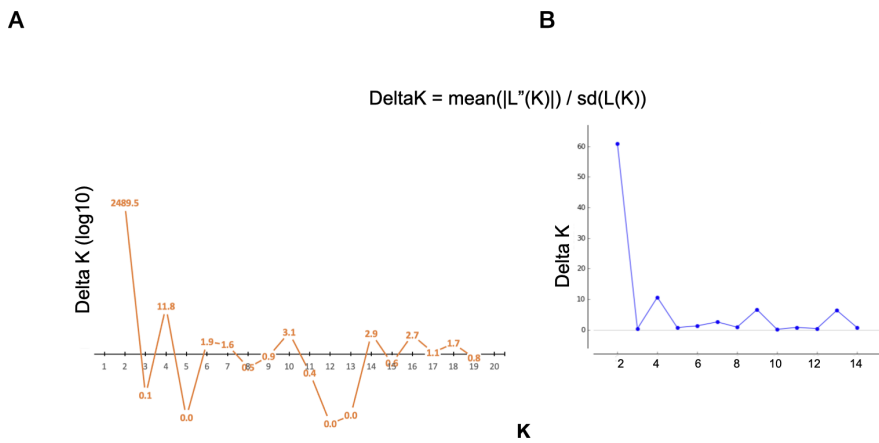
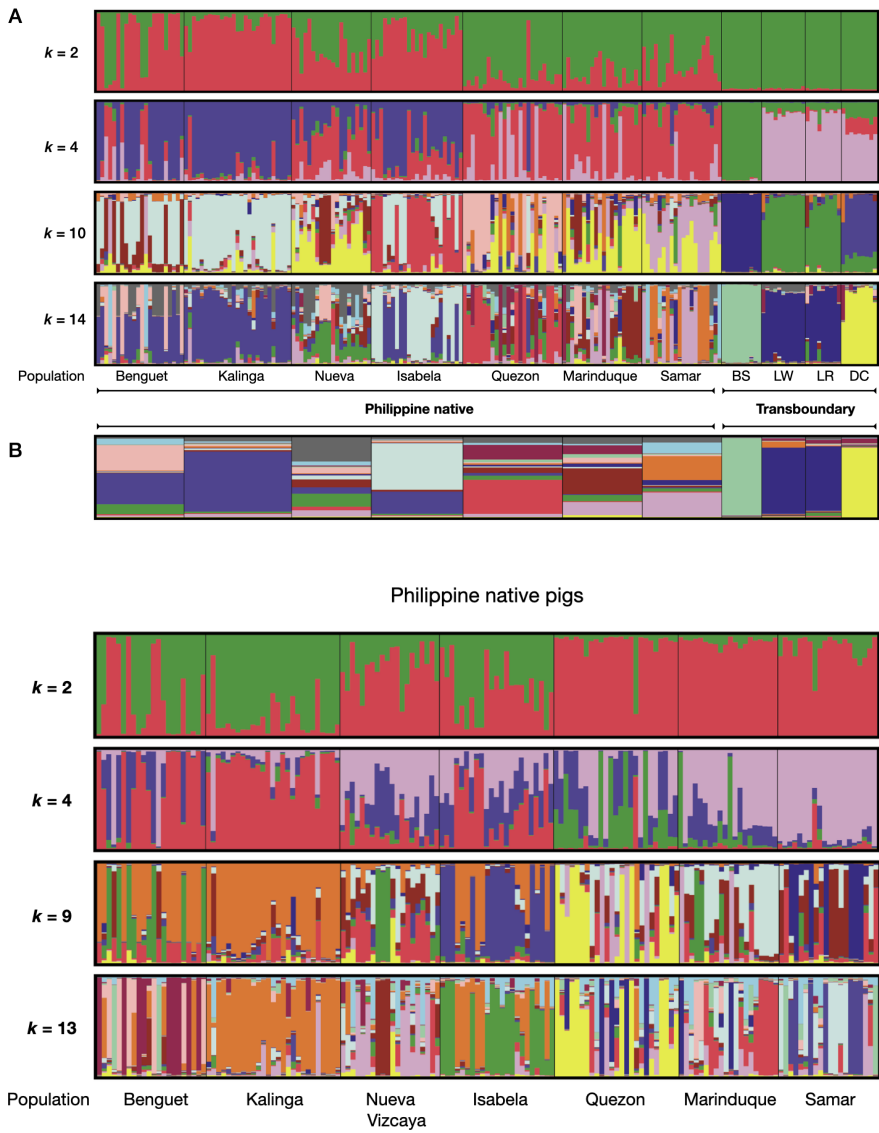
The Philippine native pig (PhNP) is a unique genetic resource with complex genetics due to multiple ancestries and hybridizations with wild pigs. No prior study has determined the population structure and genetic diversity of PhNPs on multiple islands and provinces, which is essential for establishing conservation priorities. In this study, we explore the population structure and genetic diversity of various PhNP populations in Luzon and the Visayas, Philippines, to identify conservation priorities. We analyzed 157 native pigs representing 7 populations (Benguet (B), Kalinga (K), Nueva Vizcaya, Isabela (I), Quezon (Q), Marinduque (M), and Samar (S)) and 39 pigs of transboundary distribution (Duroc, Large White, Landrace, and Berkshire). The pigs were compared against a panel of 21 ISAG–FAO recommended microsatellite markers. We tested for population structure at the island, administrative region and province levels. Strong genetic differentiation between native and transboundary breeds was confirmed by analysis of molecular variance (F_{rt}: 0.08; F_{st}: 0.288–0.728), Bayesian clustering (k = 2) and Nei's DA genetic distance (98% bootstrap support for the PhNP cluster). PhNP exhibited high heterozygosity (H_o: 0.72), a high allele count (Na: 9.24) and a low inbreeding coefficient (F_{is}: -0.022 to 0.150). Bayesian clustering supported genetic differentiation at the island (k = 2; North Luzon and South Luzon-Visayas cluster), administrative region (k = 4) and population (k = 9) levels. The pairwise F_{st} between PhNP populations ranged from 0.130 (Q and M) to 0.427 (Q and K), confirming that PhNP populations exhibited sufficient genetic distance to be considered separate populations. This study shows that the seven previously assigned PhNP populations, roughly delimited by provincial origin, are unique genetic units for conservation. Furthermore, the small effective population sizes of B, Q, I, and S (N_e: 5, 17, 24, and 26, respectively) necessitate immediate conservation actions, such as incentivizing the farming of PhNP.

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Tables and Appendix Tables microsatellite 20221116.docx available at <https://authorea.com/users/526057/articles/596130-genetic-diversity-and-population-structure-analysis-of-philippine-native-pigs-highlights-four-priority-populations-for-conservation>