

IDENTIFYING INTROGRESSION BETWEEN DOMESTIC GOAT (*CAPRA HIRCUS*) AND ALPINE IBEX (*C. IBEX*): A CASE STUDY FROM SLOVENIAN PART OF ALPS

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Domestic goats and Alpine ibexes share a habitat on mountain pastures. The spatial overlap occasionally results in hybrid offspring, as reported in Italy, France, Switzerland, and Austria [1]. In addition, we encountered three hybrids in the Slovenian part of the Alps. Confirmation of their identity and survival potential raises the question about the actual extent of such interspecific hybridisations and the possibility of ancient or more recent introgression events since the hybrids seem to be fertile. To address this, we analysed whole genome sequences from more than 160 animals belonging to domestic goat breeds and wild goat species from Africa, Asia, and Europe. We performed clustering based on the identity by state distances [2] and examined the genomic structure of the populations [3]. Our analyses confirmed that the hybrids have ancestries from both populations, the Slovenian Drežnica goat breed and the Alpine ibex. Furthermore, D-statistics [4] were used to detect and quantify gene flow between the sampled populations. The D-statistic test considers a scheme with four taxonomic units: two sister taxa (P1 and P2), of which P2 is a candidate for gene flow with an external group (P3), and an outgroup (O) that is used to determine ancestral alleles. Significant values were found in comparisons between European ibex species (Alpine and Iberian) and domestic goats. The similarity of values among domestic goats with both ibex species suggested that introgression was ancient. This inference was further supported by identifying introgressed genome sequences using the program IBDmix [5]. Despite the discovered hybrids, we did not detect any signs of recent introgression in the existing Drežnica goat and Alpine ibex populations. As the latter could represent a threat to both endangered populations, our analysis is the first step towards developing genomic tools for monitoring and coexistence of both populations in Slovenia and other countries.

References:

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