Ecology, physiology and behaviour

Resident and irruptive nomad golden jackals (*Canis aureus*) in a European forest-agricultural habitat

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The rapid range expansion of the golden jackal (*Canis aureus*) across Europe highlights the importance of understanding its spatial ecology to inform effective population management strategies. Despite their growing presence, limited research exists on the species home range dynamics within the densely populated forest–agricultural mosaics subjected to intense hunting pressure. This study investigates variations in home range sizes and movement behaviours of golden jackals in southwestern Hungary, emphasizing differences by sex, age, and season and the occurrence of irruptive nomadism. Over two years, 45 GPS-collared jackals (23 males and 22 females) were monitored for an average of 245 days each, yielding 236,675 hourly location data points. Home range sizes were calculated using the 95% kernel home range estimator, and trajectory segmentation differentiated residents (single home range) from irruptive nomads (shifting or multiple home ranges).

Resident jackals exhibited mean (±SE) home range sizes of 14.38 ± 2.27 km² (n=28), although individual ranges varied substantially, with differences reaching up to 100-fold. Male jackals generally occupied larger home ranges than females, and juveniles had more extensive ranges than adults, especially during the pup-rearing season. Home range shifts were more frequent among juveniles compared to adults and among females compared to males. The average home range size of nomadic jackals was 92.44 ± 20.59 km² (n=17). Conversely, sex and age did not significantly influence the home range sizes of irruptive nomads. Jackals predominantly utilized forested areas near forest–agriculture interfaces and avoided man-made structures. The findings revealed substantial interindividual variation in spatial usage and pronounced intra-annual changes in home range sizes between sexes, reflecting the species' ecological adaptability. These results underscore the interplay of social structure, high population density, intense hunting pressure, the absence of large carnivores, and seasonal food availability in shaping the spatial ecology of golden jackals.