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Considerations about application of the R.E.M. method to correctly evaluate the density of roe deer *Capreolus capreolus* (Linnaeus, 1758): the determining role of the v factor

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P022

The selective hunting of roe deer has been widely practised for a number of years thanks to the abundance of these animals throughout Italy. Overall, however, the number of active hunters has gradually decreased, mainly due to the advanced average age of the hunters. Year-on-year, this has made it increasingly difficult to carry out drive counts aimed at quantifying the consistency of roe deer as well as the consequent shooting plan. Therefore, it is necessary to experiment new techniques to assess densities that employ fewer people; one of these is represented by the Random Encounter Model, undertaken in 2019 by the “Genova 2 Levante” Hunting Territorial Zone under the supervision of ISPRA and discussed here in terms of the importance of the v factor.

The experiment (still in progress) has been carried out in the Aveto Valley (Municipality of Rezzoaglio), on the Po Valley side of the Genoese Apennines at altitudes between 700 and 1300 m above sea level; the data for 2019 and 2021 is shown (in 2020 no activity was carried out due to the COVID-19 lockdown). Ten square cells of 0.50 km per side were positioned, featuring maximum diversification in terms of types of land use (except for anthropogenic aspects). Two equidistant points were identified on each side of the cells; of these 8, during the monitoring, camera traps were installed in 6 points per cell: in practice 2 camera traps worked simultaneously in each cell in as many points for 10 days, for a total survey period of 30 days. The instrumentation was moved twice after the first ten days of operation. Furthermore, on 18/05/2021 an M2 roe deer was temporarily captured: an Impala GPS Ecotone Telemetry radio collar was applied to the captured roe deer to obtain on-site data useful to better quantify the daily distance travelled, represented in the model by factor v . The R.E.M. was calculated using 5 different values of v obtained from the bibliography, and using the v obtained from the data transmitted by the animal wearing

the collar.

The model was applied by using 6 different values relating to the v factor (km/24 h): 1.00; 1.25; 1.99; 4.22; 4.80; 11.90. For both years, the data processed provided very different density calculations, which fell between the following extremely wide ranges: in 2019 between 3.52 and 41.93 ind./km²; in 2021 between 3.01 and 35.84 ind./km².

Our research has shown that, among the various elements used to calculate the model, the v factor represents a particularly critical aspect because it is not easy to determine and it is currently used in a somewhat diversified manner in the scientific bibliography, to the extent that it can potentially lead to macroscopic differences in the local assessment of roe deer density. Our preliminary test seems to suggest that the telemetry data probably represents the daily micro-movements accomplished by an adult male roe deer in the Apennine area. Despite the great geomorphological and ecological differences of the locations, our opinion appears to be confirmed by telemetry data very similar to ours obtained in Sweden in 2017 as part of the sole application of the R.E.M. among those we consulted which involved the use of telemetry on 4 different roe deer to obtain the average daily distance travelled. The frequent use of somewhat low v values deduced from the bibliography, far removed from the values recorded by roe deer equipped with radio collar, could explain the apparent tendency of R.E.M. to overestimate densities like recorded by some authors compared to other counting methods, such as direct observation, snow track counts or dung counts. In conclusion, our contribution aims to be a stimulus and an invitation to technicians experimenting with R.E.M. on roe deer to carefully carry out a detailed and shared evaluation of the v factor, to avoid any possible risk of incorrectly quantifying the density of the species in areas where selective hunting is employed.