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Kernel density of sheep grazing in crop-livestock systems in the Caatinga biome monitored with GPS

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Precision technologies like the global positioning system (GPS) contribute to information accuracy regarding the ruminant relationship with the environment. Thus, it is possible to find routes and grazing sites (Kernel density), mainly in Caatinga rangelands. Integrated crop-livestock systems (ICL) are cereal, meat, milk, leather, and fiber production systems performed in the same area using simultaneous, rotational, or sequential crops. The aim of the present study was to assess the Kernel density of sheep grazing in crop-livestock systems in the Caatinga biome monitored with GPS. The experiment was conducted at the Federal Rural University of Pernambuco, Serra Talhada Academic Unit, in a thinned Caatinga site composed of Mororó tree (*Bauhinia cheilantha* Steud Bong) and enriched with Buffel grass (*Cenchrus ciliaris* L.) and Urochloa grass (*Urochloa mosambicensis* Salm-Dyck). The experimental period was carried out over two subsequent years (2022 and 2023). The treatments were three crop-livestock systems implanted in the Caatinga, comprised of the sheep livestock integrated with (i) bean crop, (ii) maize crop, and (iii) herb-cotton crop. The control treatment was composed of sole Caatinga rangeland. Twenty non-castrated male lambs (Santa Inês × Dorper crossbreed) aged six months old were used in the study, and they had an initial average weight of 24.64 ± 2.95 kg. Before the allocation in pastures, animals were equipped with GPS collars (GARMIM and Trex 20 GPS models) to monitor their behaviors. A completely randomized design with four treatments and five replications was adopted. All variables were subjected to the analysis of variance followed by the Tukey test. The differences were significant at 5% of error probability. Data on animal grazing dynamics were analyzed with the R software. The spatial information obtained from GPS was processed in the QGIS software. Sheep maintained on pasture of sole Caatinga rangeland occupied fewer grazing sites ($P < 0.05$, Kernel density) than animals kept in Caatinga pastures integrated with beans, cotton, or maize. However, sheep subjected in the sole Caatinga rangeland showed higher Kernel density ($P < 0.05$) than those kept in the ICL systems. The treatments ICL systems with bean crop, maize crop, herb-cotton crop, and sole Caatinga rangeland showed values of 2.09b, 1.01c, 2.06b, and 2.29a, respectively. Before starting the trial, we standardized the herbaceous sward and opened strips to plant crops. The exclusive treatment of Caatinga vegetation did not receive opening for the cultivation of corn, beans, and cotton, resulting in greater growth of grasses. Sheep occupied fewer grazing areas, but with higher Kernel density. GPS is useful for identifying grazing sites in integrated systems in the Caatinga.

Keywords: behavioral patterns; grazing sites; lamb; semi-arid ecosystem

Animal Experimentation Ethics Committee of the Federal Rural University of Pernambuco (approval no. 2436310322).

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