

Group Size, Density, and Enclosure Size; Implications on Movement and Space Use Patterns in Broilers

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Movement and space use patterns in captive animals depend on the size of the enclosure, but may also differ according to the number of animals and the stocking density in the enclosure. However, confounding between factors when estimating the inherent effects of group size, density or enclosure size limit our knowledge of the contributions of each factor to movement patterns. Because group size and density are often manipulated in poultry production it is of fundamental relevance to determine their effects so that spatial requirements to assure poultry welfare can be better established. To achieve this goal we used an experimental design based on multiple contrasts which allowed us to hold enclosure size, group size and density constant and better isolate their specific impact on spatial patterns in broilers. Our experimental treatments consisted of a combination of three enclosure sizes: small (1.5 m²), medium (3.0 m²) and large (4.5 m²) and three group sizes of 10, 20, and 30 birds. Observations were conducted from three to six weeks of age. The location of focal individuals and their position relative to all other group members was recorded as X Y coordinates. Data were transferred to SAS (v. 9.1, SAS) for analysis of nearest neighbour distances, total and net displacement and movement activity. Minimum convex polygons were determined using ArcView GIS v8 (ESRI). We made statistical comparisons across increasing enclosure size while holding group size and density constant, and compared the effect of increasing group size/density at a constant enclosure size. Our results indicate that nearest neighbour distances among birds increased proportionally to the size of the enclosure, but its effect appeared to be modulated by density. While we did not detect differences in total distance travelled across treatments, net displacement and minimum convex polygons increased with enclosure size regardless of group size or density. In conclusion, the results of this study provide evidence of the distinct effects of enclosure size, group size and density on movement and space use. Enclosure size was revealed as the most critical factor affecting movement patterns and space use in broilers. Contrary to our expectations we found no evidence of social restriction on space use related to the effects of group size; density appeared to modulate the use of space patterns.

Keywords: broilers, space, group size, density