Fuzzy, geoestatistical and statistical modeling for the assessment of confinament system for cattle in the compost barn model

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Abstract: The present research is driven by the following objectives: (i) perform Geostatistics modeling to map and represent facilities of confinement of dairy cattle in the Compost Barn model; (ii) apply tests to evaluate bed material and agricultural implements used in this confinement system; and (iii) develop Fuzzy models to infer the composting factors of bed material from measurable variables of the bed itself. To this end, it is assumed that the knowledge of the characteristics of the bed and climatic factors in the Compost Barn installation is an essential means for the sustainability of the dairy cattle sector with respect to the management conditions and ambience. The data were submitted to Geostatistics modeling and interpolation by kriging. With respect to Fuzzy modeling, were consider functional models of the Takagi-Sugeno type with parameter adjustment from the data and of the C-Means algorithm were considered. The experiments were conducted on a rural property in the State of Minas Gerais, located in the city of Três Corações. The data considered were collected in eight distinct periods of the summer and winter of 2016 and in the period from October 2016 to February 2017, featuring three experiments. The methodology used were the quantitative analysis, with application of statistical test for paired data and analysis of variance. In addition, Geostatistics and Fuzzy modeling approaches were developed to represent and analyze bed issues and climatic conditions in dairy cattle facilities. Finally, bed residuals were evaluated as organic fertilizer to grow corn crops.

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Keywords: Organic fertilizer; Dairy Cattle; Animal Comfort; Composting; Field Building; Installations for Cattle; Kriging Map; Modeling Computational; Fuzzy Systems; Confinement Systems.

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