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Fuzzy Logic Based Ventilation for Controlling Harmful Gases in Livestock Houses

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Abstract : There are many factors that influence the health and productivity of the animals in livestock production fields, including temperature, humidity, carbon dioxide (CO2), ammonia (NH3), hydrogen sulfide (H2S), physical activity and particulate matter. High NH3 concentrations reduce feed consumption and cause daily weight gain. At high concentrations, H2S causes respiratory problems and CO2 displace oxygen, which can cause suffocation or asphyxiation. Good air quality in livestock facilities can have an impact on the health and well-being of animals and humans. Air quality assessment basically depends on strictly given limits without taking into account specific local conditions between harmful gases and other meteorological factors. The stated limitations may be eliminated. using controlling systems based on neural networks and fuzzy logic. This paper describes a fuzzy logic based ventilation algorithm, which can calculate different fan speeds under pre-defined boundary conditions, for removing harmful gases from the production environment. In the paper, a fuzzy logic model has been developed based on a Mamedani's fuzzy method. The model has been built on MATLAB software. As the result, optimum fan speeds under pre-defined boundary conditions have been presented.

Keywords : air quality, fuzzy logic model, livestock housing, fan speed
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