ABSTRACT

The increasing demand and limited supply of fresh beef have caused meat prices to soar. This situation has led to the practice of mixing unfit (spoiled) meat with fresh meat. To address this issue, this study designs and implements a detection system for classifying the freshness of beef based on Electronic Nose (E-Nose) and Fuzzy Logic. The system utilizes three gas sensors: MQ-137 to detect NH_3, MQ-136 to detect H_2S, and TGS 2602 to detect VOC (Volatile Organic Compounds), specifically toluene. These gases are primary indicators of meat spoilage. Data obtained from the sensors are processed using the Mamdani Fuzzy Logic method to improve classification accuracy. The system implementation results demonstrate high accuracy, with an average error of 0.02% when compared to simulations in Matlab. The system is capable of classifying beef quality into three categories: fresh, moderate, and spoiled, based on gas concentration (ppm). Test results show that H_2S gas exhibits the most significant increase in ppm, compared to NH_3 and VOC. The highest points for fresh, moderate, and spoiled meat quality have gas concentration are 13.57 ppm, 29.53 ppm, and 77.90 ppm, respectively. Overall, this system has proven to be valid and feasible for detecting beef quality based on gas concentration levels. This implementation is expected to serve as a solution to prevent the sale of spoiled meat and enhance food safety for the public.

Keywords*: Electronic Nose, Fuzzy Logic Mamdani, MQ-136, MQ-137, TGS 2602*