CONSTRUINDO SABERES, FORMANDO PESSOAS E TRANSFORMANDO A PRODUÇÃO ANIMAL

CLASSIC FUZZY LOGIC AND TOP-DOWN IN PORK QUALITY GRADING

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The main parameters used classify pork quality are pH, water holding capacity (WHC) and lightness (L*). However, in general, when a meat sample presents a high final pH, and therefore is above the isoelectric point of myofibrillar proteins it configures a higher WHC due to the natural spacing of these proteins. As a consequence of the higher WHC, occurs a large retention of intracellular water. When a beam of light is placed on it, less light reflects and a darker flesh obtains lower L* and when the pH of meat approaches the isoelectric point of myofibrillar proteins, the WHC reduces and the L* value increases, leaving the meat with lighter coloration. Meat quality parameters are usually based on numerical ranges for the standardization of grading methods. The current classifications proposed do not correspond to some samples of animals from different production chains. These unclassifiable samples are not able to fit into a pattern created by a clear range of values because they are impractical in their definition. An alternative to dealing with this sort of sample classification is fuzzy logic, which could deal with uncertainty and the degree of ambiguity as human reasoning. In this work, we compare the traditional classification method and fuzzy approach (classical logic and fuzzy top-down) with the objective to handle the infeasible samples. Classical logic is based on the grade's rule composed of crisp limits, changing to a degree of pertinence. Top-down is a manual fuzzy classification model designed by human experts, where the limits and degrees need to be designed by adapting the crisp limits. We used ten real-life datasets with a total of 1,031 pork samples and the *longissimus dorsi at lumborum* muscle were measured pH, WHC and L* parameters. Our classification experiments were based in three standards already described in the literature: Kauffman et al. (1993), Warner et al. (1997) and Faucitano et al. (2010). The results demonstrated that classical logic could not classify the infeasible samples. On the other hand, the fuzzy approach improves significantly the number of classified samples and samples continue infeasible. These could indicate the occurrence of extrinsic factors from samples, like measurement errors, problems in acquisition technique or device calibration.

Keywords: artificial intelligence, classification, fuzzy rule based system, meat quality

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