Effects of Zeolite-Added Porous Clay-Based Bedding Additive as Moisture/Ammonia Sorbent on Broiler Performance and Welfare

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In modern broiler production, to maintain both environmental quality and animal welfare has become increasingly vital. In the housing system, a bedding material is one of the key factors contributing to litter condition, air quality and animal comfort. Ammonia emission from chicken manure is a serious problem for broiler production, especially it causes footpad dermatitis. This study aimed to develop and evaluate a novel bedding material composing of ball clay, rice husk ash and zeolite, in order to enhance physicochemical performance and improve broiler welfare outcomes. In vitro analysis was conducted on a clay-based composite made from ball clay, rice husk ash and zeolite 13X with various compositions. The mixtures were thoroughly mixed and extruded into rod-shape pellets, dried and fired at 600^{o}C. Their characteristics and properties, including phase content, microstructure, strength, density, specific surface area, water absorption and ammonia adsorption capacity, were examined. The selected composition was up-scaled for In vivo analysis. The pellets were extensively produced to apply from 0, 10, 20 to 40 % layering onto a 5 cm-thick conventional bedding material, rice husk, in chicken broiler. Broiler performance and chicken welfare, such as body weight, average daily gain, feed conversion ratio, litter condition and footpad dermatitis, were carefully monitored over a 40-day grow-out period. This study demonstrated that the introduced zeolite-containing porous clay-based bedding of 10 and 20% add-on offered a welfare-enhancing option to conventional rice husk. Less footpad lesion, lowered pH and ammonia emission was noticeably detected. The introduced pellets could reduce ammonia levels and also provide comfort to chickens. Moreover, its potential of environmental improvement of the pellets during-use and post-use as fertilizers could make it even more sustainable poultry production systems.