Bioburden, phenotypic and spectroscopic characterisation of toxigenic and atoxigenic Aspergillus section Flavi from poultry feeds in Kelantan, Malaysia and Katsina, Nigeria

ABSTRACT

Aims: The natural coexistence of high humidity and warm temperatures in Malaysia and Nigeria and poor storage facilities used by most poultry feed vendors provide suitable conditions for the proliferation of aflatoxigenic fungi and aflatoxigenesis. This study aims to characterise and evaluate the toxigenicity of Aspergillus section Flavi (ASF) from Malaysian and Nigerian poultry feeds. Methodology and results: This study utilised standard mycological techniques to determine the bioburden and distribution of mycoflora in 132 and 144 Malaysian and Nigerian poultry feeds, respectively. The ASF isolated from the samples were tested for aflatoxigenicity by thin-layer chromatography (TLC) and then characterised by multivariate using attenuated total reflectance fourier transformed infrared spectroscopy (ATR-FTIR). A total of 128 and 75 mould fungal isolates belonging to 12 and 11 species were obtained from the Malaysian and Nigerian samples with a bioburden ranging from 2.0 to 6.97 log CFU/g and the highest overall mean count of 5.66 ± 4.51 log CFU/g and 5.6 ± 4.76 log CFU/g, respectively. Aspergillus fumigatus, Aspergillus felis, Aspergillus flavus/parasiticus and Fusarium graminearum were predominant in poultry feeds from both countries. Overall, 16 ASF were isolated (Malaysia = 7, Nigeria = 9), of which only three produce aflatoxins. The multivariate cluster analysis of ATR-FTIR spectra showed 97.78% similarity between the toxigenic and atoxigenic ASF with primary differences at 600 to 800 cm-1 and 2927 to 4000 cm-1 only. Conclusion, significance and impact of study: The bioburden of fungal flora in the samples was higher than the ICMSF's acceptable range of 2.0 to 5.0 log CFU/g, indicating that they could be hazardous to poultry and necessitate stricter control measures. Irrespective of the country/source of samples, the ATR-FTIR has discriminated the toxigenic from atoxigenic ASF, implying its promising prospects for rapid identification of toxigenic ASF