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Development of a PCR assay for the detection of pork adulteration in raw and processed chicken

M M E Munasinghe[1], D P D C De Silva[1], N P Kaluarachchi[1], S T Sabaragamukorala[1], S M Wickramasinghe Arachchi[1], K S L Dalpatadu[1], N V Chandrasekharan[2] and S G Senaratne[3⋆]

[1]Biotechnology Unit, Industrial Technology Institute, Colombo 07
[2]Department of Chemistry, Faculty of Science, University of Colombo, Colombo 03
[3]Vocational Training Authority, Nipunatha Piyasa, Colombo 05

Increasing world population and the increasing demand for meat and meat products has led to the fraudulent substitution/ adulteration of high demand meat with cheaper ones. A recent scandal involving the adulteration of beef with horse meat was reported from the UK. Awareness on meat adulteration is necessary in the food industry due to the food habits of individuals and their religious and cultural concerns (e.g. HALAL standards). Towards prevention, methods need to be developed to detect adulteration. Molecular methods provide a more accurate and reliable method for detection of adulteration. The mitochondrial cytochrome b (Cyt b) gene has been commonly used to detect the source of meat. In this study, using the Cyt b gene, a PCR based method was developed to detect pork adulteration in raw and processed meat products. For this purpose, the Cyt b gene sequences of swine, chicken, goat, cattle, horse and dog were aligned and primers designed (from regions showing variations) for the specific amplification of porcine Cyt b only. The expected size of the amplified product was 537 bp. DNA was extracted using a modified sodium dodecyl sulphate (SDS) method from pork and chicken samples as well as chicken containing 0.5%, 1%, 10%, 30% and 50% pork. Another set of samples containing the same composition was boiled for 1 hour and 45 minutes in water and the DNA extracted. After performing the PCR assay, the products were electrophoresed on a 2% agarose gel containing 0.5 µg/ml ethidium bromide and visualized under UV trans-illuminator. Results indicated that adulterations as low as 0.5% pork could be detected using the PCR assay developed in this study. The assay was also found to be valid for both raw and processed meat samples with about the same sensitivity. Pork specific primers amplified only porcine DNA. No amplified products were observed with chicken, goat, cattle, horse and dog DNA indicating the assay to be specific for pork. Included in each assay was a non-template control. Analysis of 30 samples of raw and processed chicken (sausages, ham, meat balls and cooked chicken) from markets in the Colombo District indicated pork adulteration in two samples.

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head-btu@iti.lk Tel: 071832911