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Rapid and Reliable Identification of Meat Origin in Meat Products Using CP-M-PCR

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ABSTRACT

A fast and reliable analytical method is necessary to detect adulteration practices in meat-based products in order to provide a sufficient guarantee to protect consumer rights in accordance with European Union and Malaysian Description Act 2011. A single-tube multiplex PCR-based assay namely Common Primer Multiplex PCR (CP-M-PCR), for the detection of meat origin was developed, optimised and used to evaluate the presence of fraudulently added meat in meat products. This effort assists in the detection of pig, ruminant, avian, and rabbit, which multiple target fragments were amplified from mitochondrial NADH dehyrogenase subunit 4 (Nad 4) gene. The designed primers generated specific fragments of 267, 370, 504, and 548 bp lengths for pig, ruminant, avian and rabbit meats, respectively. This system was designed based on the ability of a unique sequence which served as a universal reverse primer and a common forward primer shared by all of the animal groups to amplify the target fragments specifically. The developed system was applied to 42 commercial meat-products and showed the presence of avian meat in analyzed ruminant (1/14), rabbit (1/2) and pig (1/10) samples. CP-M-PCRgreatly removed the poor universality and inconsistency of multiplex PCR. Additionally, it provides a rapid, cost-effective and more sensitive method with a detection limit of 0.01 ng of DNA. This highly sensitive, reproducible and practical method could potentially be applied in other areas, such as species identification, bio-security and forensic.

Keywords: *CP-M-PCR, meat, Nad 4 gene*