



METHOD IDENTIFICATION OF PCR-BASED AND ELISA-BASED PORCINE DETECTION ON HIGHLY PROCESSED COLLAGEN SAMPLES FOR HALAL AUTHENTICATION

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FACULTY OF AGRICULTURAL TECHNOLOGY
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Bogor, August 2024

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ABSTRAK

CAMILLA DEWANTHY PUTRI BASUKI. Identifikasi Metode Deteksi Turunan Babi Berbasis PCR dan ELISA pada Sampel Kolagen yang Diproses Tinggi untuk Otentikasi Halal. Dibimbing oleh AZIS BOING SITANGGANG.

Kolagen adalah salah satu bahan umum dan merupakan protein penting yang digunakan dalam produk olahan, seperti industri makanan, kosmetik, farmasi, dan biomedis karena kegunaannya yang beragam. Sumber utama kolagen adalah babi, sapi, dan hewan laut. Hal ini sering diambil dari kulit, tulang, tendon, dan kulit hewan, seperti babi dan sapi, pada skala industri. Penelitian ini bertujuan untuk mengidentifikasi metode alternatif yang mendeteksi protein dengan *enzyme-linked immunosorbent assay* (ELISA) terhadap metode PCR DNA saat ini. Sampel kolagen yang diproses secara berlebih (*highly processed*) dideteksi secara akurat sebagai positif atau negatif berasal dari babi, serta menghitung *False Negative Rate* dari setiap metode. Hasilnya menunjukkan bahwa jumlah sampel kolagen babi yang diproses secara berlebih (*highly processed*) terdeteksi positif imbang pada setiap metode. Temuan ini menunjukkan bahwa ketika menerapkan prosedur di laboratorium, kombinasi *real-time* PCR dan ELISA berpotensi lebih efektif dalam mengautentikasi sampel produk secara tepat. Misalnya, ketika mendeteksi babi dengan produk kolagen tipe II yang tidak didenaturasi (*undenatured*), *real-time* PCR akan bermanfaat untuk deteksi konsentrasi rendah, sementara ELISA dapat membantu mengatasi negatif palsu (*false negative*) yang disebabkan oleh DNA terdegradasi atau terfragmentasi, penghambatan PCR, dan kontaminasi protein oleh protein kolagen itu sendiri.

Kata kunci: babi, ELISA, *highly processed*, kolagen, PCR



ABSTRACT

CAMILLA DEWANTHY PUTRI BASUKI. Method Identification of PCR-Based and ELISA-Based Porcine Detection on Highly Processed Collagen Samples for Halal Authentication. Supervised by AZIS BOING SITANGGANG.

Collagen is among the common ingredients and an essential protein used in highly processed products, such as food, cosmetic, pharmaceutical, and biomedical industries because of its diverse uses. The main sources of collagen are pigs, cows, and marine animals. It is frequently collected from the hides, bones, tendons, and skin of animals like pigs and cows on the industrial basis. This research aims to identify an alternative protein approach with enzyme-linked immunosorbent assay (ELISA) to the current DNA method of PCR. Therefore, highly processed collagen samples can be accurately detected as positive or negative for porcine, as well as calculate the False Negative Rate of each method. The results showed that the same amount of highly processed porcine collagen samples was accurately detected as positive with each method. The findings suggest that when employing this current procedure in the laboratory, a combination of real-time PCR and ELISA may be more effective in precisely authenticating the product sample. For example, when detecting porcine with undenatured type II collagen products, real-time PCR would be advantageous for low-level detection, while ELISA may aid in overcoming false negatives caused by degraded or fragmented DNA, PCR inhibition, and protein contamination by the collagen proteins themselves.

Keywords: collagen, ELISA, highly processed, PCR, porcine



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CAMILLA DEWANTHY PUTRI BASUKI

Undergraduate thesis
as a requirement for obtaining a
Bachelor's degree in
Food Technology

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FACULTY OF AGRICULTURAL TECHNOLOGY
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FOREWORD

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Hopefully, this scientific work will be useful for those in need and for the advancement of science.

Bogor, August 2024

Camilla Dewanthy Putri Basuki

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