DETERMINATION OF BOVINE AND PORCINE GELATIN POLYPEPTIDES USING SODIUM DODECYL SULPHATE-POLYACRYLAMIDE GEL ELECTROPHORESIS (SDS-PAGE)
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By

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DETERMINATION OF BOVINE AND PORCINE GELATIN POLYPEPTIDES USING SODIUM DODECYL SULPHATE-POLYACRYLAMIDE GEL ELECTROPHORESIS (SDS-PAGE)

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Chairman : Professor Amin bin Ismail, PhD
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Gelatin is used widely in food and pharmaceutical industries because of its unique physicochemical characteristics. However, the gelatin utilisation becomes an issue among Muslim, Jews and vegetarians due to its animal origin. As such, methods of gelatin detection and differentiation as well as gelatin stability in the processed foods have emerged as an important research area to be studied. Therefore, the aim of this study was to detect and differentiate the bovine and porcine gelatin polypeptides using a combination method of sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE) and Principal Component Analysis (PCA).
Utilising optimal conditions of SDS-PAGE with 6% of resolving gel, 8 µg amount of protein, 8 M Urea-SDS sample buffer, together with sensitive silver staining had exhibited molecular weights of gelatin polypeptides ranged from 53 to 220 kDa. They can be used to differentiate between bovine and porcine gelatins. The gelatin of porcine exhibited wider molecular weight distribution as compared to bovine that consisted of 11 and 2 prominent bands, respectively. In addition, these prominent bands were stable under heat treatment and consistent even in different Bloom number offer suitability for the identification of gelatin sources. In order to determine the detection limit of SDS-PAGE in detecting the percentage of adulterated samples, PCA was applied to classify the percentage of adulteration in the samples. Results showed that SDS-PAGE combined with PCA was unable to detect the presence of less than 5% porcine gelatin adulterated in the bovine gelatin. To detect the presence of gelatin in the samples, both extracting solutions (cold acetone and deionised water) are suitable; however, for commercial processed products with mixed ingredients cold acetone was more efficient. In the study, the qualitative comparison using SDS-PAGE between samples could be differentiated by PCA, and the combination may provide robust information for gelatin species identification. This study proposed that this new approach employing SDS-PAGE and PCA together with a simple gelatin extraction method may provide a useful tool for food authenticity issues concerning gelatin.
Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains

PENENTUAN POLIPEPTIDA GELATIN “BOVINE” DAN “PORCINE” MENGGUNAKAN NATRIUM DODESIL SULFAT -ELEKTROFORESIS GEL POLIAKRILAMIDA (SDS-PAGE)

Oleh

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I certify that a Thesis Examination Committee has met on 6 April 2012 to conduct
the final examination of Nur Azira binti Tukiran on her thesis entitled
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DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

NUR AZIRA BINTI TUKIRAN

Date: 6 April 2012
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