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HALAL COLLAGEN EXTRACTION FROM YOUNG AND SPENT RABBIT

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FACULTY OF AGRICULTURE

UNIVERSITI PUTRA MALAYSIA

SERDANG, SELANGOR DARUL EHSAN

2015/2016

HALAL COLLAGEN EXTRACTION FRO M YOUNG AND SPENT

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NURUL FAZLIANA BINTI ABDUL GHANI

A project report submitted to the Faculty of Agriculture, Universiti Putra Malaysia, in fulfilment of the requirement of SHW 4999 (Final Year Project) for the award of the degree of Bachelor of Agriculture (Animal Science)

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CERTIFICATION

This report Halal collagen extraction from young and spent rabbit was prepared by Nurul Fazliana binti Abdul Ghani and submitted to the Faculty of Agriculture in fulfilment of the requirement of SHW 4999 (Final Year Project) for the award of the degree of Bachelor of Agriculture (Animal Science).

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HALAL COLLAGEN EXTRACTION FROM YOUNG AND SPENT RABBIT

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Keywords: Halal, Rabbit Collagen, gelatine, extraction method, collagen purity

ABSTRACT

A Research was conducted to determine the percentage of collagen in young and spent rabbit muscles and legs bone. Nowadays, there are a lots of collagen production in industries but the main issues is the halal status of the collagen. A lots of collagen production in industries nowadays are the non- halal collagen from non- halal animals. Rabbit is the halal animal that have potential in collagen production. Biomedical industry have used young rabbit to extract hormone and enzyme while the carcass of rabbit will throw away. Rabbit breeder industry have thrown the spent rabbit carcass that do not suitable to eat any more. As alternative to improve and produce the halal collagen, these waste product from biomedical industry and rabbit breeder industry can be used in industry of collagen and indirectly will maximize the profit of both industries. This is because the rabbit carcass can be used as collagen sources instead of throw it away. The samples of young rabbit (2-3 months of age) and spent rabbit (> 1 year of age) were randomly selected. Collagen extraction was compared between the method 1 and method 2. Method 1 of collagen extraction was using Acetic Acid

and Sodium Hydroxide while extraction of collagen in method 2 was using amyl alcohol, acetic acid and sodium chloride. The comparison of muscle and leg bone collagen content was conducted. The sample was compare to determine which sample produce more collagen. Besides, chemical analysis which is proximate analysis was conducted to evaluate the purity of the collagen and the chemical content on fresh samples. There were significantly different ($P<0.05$) for collagen extraction in both methods. The young rabbit bone in both method showed lower percentage of collagen extraction then spent rabbit bone. The percentage of young rabbit bone collagen are (13.59%) in method 1 and (9.0%) in method 2 while spent rabbit bone collagen are (15.35%) in method 1 and (9.39 %) in method 2. The young rabbit muscle collagen have lower percentage of collagen then spent rabbit muscle collagen in both methods. The percentage of young rabbit muscle collagen in method 1 is (18.04%) and spent rabbit muscle collagen is (18.21%) while young rabbit muscle collagen in method 2 is (12.74%) and spent rabbit muscle collagen is (14.12%). The time consume by method 1 to finish the extraction process is about 5 days while method 2 about 7days and above. The protein percentage in collagen from method 2 higher than the collagen from method 1 while the ether extraction percentage in method 1 is lower than method 2. That's means, the collagen extraction from method 1 have lower percentage of fat. The lower the fat percentage, the high the purity of the collagen. Besides, the gelatine quality and characteristics test shown that there have no significant different in colour of gelatine. All the gelatine have yellowish in colour. The texture test shown that the gelatine come from muscle are more soft and sticky while gelatine from bone are more coarse and sticky. Based on the results, spent rabbit and muscle part have more collagen yield then young rabbit and bone part. However, extraction method 1 is more efficient to extract more collagen and have short time period of extraction than method 2.

Abstrak tesis yang telah dikemukakan kepada senat Universiti Putra Malaysia dalam memenuhi keperluan penganugerahan Ijazah Bacelor Pertanian (Sains Ternakan)

PENGEKSTRAKTAN KOLAGEN HALAL DARIPADA ARNAB MUDA DAN ARNAB PENCEN

Oleh:

NURUL FAZLIANA BINTI ABDUL GHANI

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Kata kunci: Halal, Kolagen arnab, gelatin, cara ekstrak, ketulinan kolagen

ABSTRAK

Sebuah kajian telah dijalankan untuk mengenalpasti peratusan kolagen di dalam otot dan tulang arnab muda dan arnab pencen. Pada masa kini, terdapat banyak pengeluaran kolagen dalam industri tetapi isu utama adalah status halal kolagen tersebut. Terdapat banyak kolagen yang di hasilkan dalam industri pada masa kini adalah kolagen yang tidak halal daripada sumber haiwan yang tidak halal. Arnab adalah haiwan yang halal dan mempunyai potensi dalam produksi kolagen. Industri bioperubatan telah menggunakan arnab muda untuk menekstrak hormon dan enzim manakala karkas arnab akan dibuang. Industri arnab pembaka akan membuang karkas arnab pencen yang tidak sesuai untuk dimakan. Sebagai alternative untuk meningkatkan produksi kolagen Halal, sisa dari industri bioperubatan dan arnab pembiak boleh digunakan untuk penghasilan kolagen dan secara tidak langsung memberi untung maksima kepada kedua-dua industri. Ini kerana karkas arnab boleh digunakan untuk menghasilkan kolagen daripada hanya dibuang begitu sahaja. Sempel daripada arnab muda (berumur 2-3 bulan) and arnab pencen (berumur > 1 tahun) telah dipilih secara rawak.

Pengekstraktan kolagen telah dibandingkan antara keadah 1 and keadah 2. Kaedah 1 mengunakan asid asetik dan sodium hidrosida manakala kaedah 2 menggunakan alkohol amyl, acid asetik dan sodium klorida. Perbezaan antara kolagen dalam otot dan tulang telah dijalankan. Sampel telah dibandingkan untuk mengenal pasti sample mana yang menghasilkan lebih banyak kolagen. Selain itu, analisa kimia iaitu analisa proximate telah dijalankan untuk mengenalpasti ketulinan kolagen dan kandungan kimia dalam sampel segar. Terdapat perbezaan ketara ($P<0.05$) untuk kedua-dua kaedah pengektraktan. Arnab muda dalam kedua-dua kaedah menunjukkan peratusan kolagen yang rendah berbanding arnab pencen. Peratusan kolagen dalam tulang arnab muda ialah (13.59%) dalam kaedah 1 dan (9.0%) dalam kaedah 2 manakala kolagen tulang arnab pencen ialah (15.35%) dalam kaedah 1 dan (9.39%) dalam kaedah 2. Otot arnab muda mengandungi peratusan kolagen yang rendah berbanding otot arnab tua dalam kedua-dua kaedah. Peratusan kolagen dalam otot arnab muda dalam kaedah 1 ialah (18.04%) dan otot arnab pencen ialah (18.21%) manakala otot arnab muda dalam kaedah 2 ialah (12.74%) dan otot arnab pencen ialah (14.12%). Masa yang diperlukan oleh kaedah 1 untuk siap proses estrak ialah lebih kurang 5 hari manakala kaedah 2 memerlukan masa 7 hari dan keatas. Peratusan protein dalam kolagen kaedah 2 lebih tinggi daripada kolagen kaedah 1 manakala peratusan ether ektraksi dalam kaedah 1 lebih rendah daripada kaedah 2. Ini bermaksud, kolagen yang di ekstrak dari kaedah 1 mengadungi peratusan lemak yang rendah. Semakin rendah peratusan lemak, semakin tinggi ketulinan kolagen tersebut. Selain itu, ujian kualiti dan ciri-ciri gelatin menunjukkan tidak ada perbezaan ketara dalam warna gelatin yang terhasil semua gelatin bewarna kekuningan. Ujian tekstur menunjukkan gelatin daripada otot lebih lembut dan belendir manakala gelatin daripada tulang lebih kasar dan belendir. Berdasarkan keputusan, arnab pencen dan bahagian otot mempunyai lebih banyak kolagen daripada arnab muda dan bahagian tulang. Walau bagaimana pun, kaedah ektraksi 1 lebih berkesan unutk mengekstrak lebih banyak kolagen dan memerlukan kurang masa berbanding kaedah ektraksi 2.

CHAPTER 1

1.0 INTRODUCTION

Collagen is a group of naturally occurring proteins. In nature, it is found in animals, especially in the flesh and connective tissues of mammals. It is the main component of connective tissue, and is the most abundant protein in mammals, making up about 25% to 35% of the whole body protein content. Collagen, in the form of elongated fibrils, is mostly found in fibrous tissues such as tendon, ligament and skin, and is also abundant in cornea, cartilage, bone, blood vessels, the gut, and intervertebral disc. (Hussin, 2012). Collagen is very important in cosmetic and medicine industry.

There are too difficult to find the Halal collagen making for Muslim use. The Halal collagen can be extracted from halal animal that slaughter in Halal way. The Arabic word Halal means permissible, and the rules of slaughter are based on Islamic law. The animal has to be alive and healthy, a Muslim has to perform the slaughter in the appropriate ritual manner, and the animal's throat must be cut by a sharp knife severing the carotid artery, jugular vein and windpipe in a single swipe. Blood must be drained out of the carcass.

Mature bone is composed of proteins and minerals. Approximately 60% the weight of the bone is mineral, mainly calcium and phosphate. The rest is water and matrix, which is formed before the mineral is deposited, and can be considered the scaffolding for the bone. About 90% of the matrix proteins are collagen, which is the most abundant protein in the body. Collagen is very strong and forms bone, cartilage, skin, and tendons(Young,

2003). The side product from collagen extraction from bone is Di calcium phosphate which is also can be used in animal feed industry.

Meat is a major source of proteins, essential amino-acids, complex-B vitamins, minerals, and other bioactive compounds. Recommended by nutritionists over other meats, rabbit meat is valued for its nutritional properties because is lean, rich in proteins of high biological value, low in cholesterol content and high in linolenic acid. Rabbit meat was richer in calcium (21.4 mg/100 g) and phosphorus (347 mg/100 g) than other types of meat and lower in fat (9.2 g/100 g) and cholesterol (56.4 mg/100 g) (Nistor et al., 2013).

Nowadays, there have biomedicine industries that use young rabbit for medicine purpose such as for vaccine production and for hormone extraction. They only use certain part of the rabbit and the carcass will be throw. Instead of throw the carcass, the carcass can be used for collagen making. On the other hand, the rabbit breeder industries will produce the spent rabbit which is the use of meat from this kind of rabbit among consumers is very low. So that, the carcass can be used for collagen extraction to avoid wasting.

1.1 SIGNIFICANT OF STUDY

Nowadays, there are too difficult to find the collagen from halal sources. Most of the collagen in market come from swine or from animal that do not slaughter in Halal way. As alternative to improve and produce the halal collagen, the waste product from biomedical industry and rabbit breeder industry can be used in industry of collagen and indirectly will maximize the

profit of both industry. This is because the rabbit carcass can be used as collagen source instead of throw it away.

1.2 OBJECTIVE

General objective of this study is to extract the collagen from rabbit muscle and bone to produce Halal collagen.

The specific objective are:-

1. To compare the percentage of collagen content in whole muscle and legs bone of young and spent rabbit in method 1(acetic acid and sodium hydroxide) and method 2(amyl alcohol, acetic acid and sodium chloride)
2. To identify the chemical composition of collagen in young and spent rabbit
3. To identify the gelatine physical quality and characteristics

1.3 HYPOTHESIS

Spent rabbit expected to provide higher percentage of collagen then young rabbit while muscle part expected to provide higher percentage of collagen then bone part.

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