CHAPTER I
INTRODUCTION

1.1. Background of Research

Islam teaches its followers to consume only the permitted products (halal and wholesome products) as can be seen from some verses in Qur'an in Al-Baqarah verse 168 :

يَا أَيُّهَا النَّاسُ كُلُوا مِمَّا فِي الْأَرْضِ حَلَالًا طَيِّبًا وَلَا تَتَّبِعُوا خُطُوَاتِ الشَّيْطَانِ ۚ إِنَّهُ لَكُمْ عَدُوٌّ مُبِينٌ

O, people! Eat of the lawful and pure things in the earth and follow not in the footsteps of Satan. For surely he is your open enemy (QS. Al Baqarah 2: 168)

Some Islamic countries have established strict regulations for producers to stamp their products with the halal certificate to distinguish them from the non-halal product. In this regard, development of the reliable method for producing the halal pharmaceutical product is very critical.

One of the pharmaceutical products that have an important part in the pharmaceutical industry is gelatin. Gelatin is a purified protein obtained either by the partial acid hydrolysis (type A) or by the partial alkali hydrolysis (type B) of animal collagen [1]. Gelatin is used in many food products, including jellies, ice cream, confectionery, cookies, and cakes [2]. It is also used in non-food products, including medical products such as pharmaceutical aid (suspending agent, encapsulating agent, tablet binder,

[1] WHO, *The International Pharmacopoeia Sixth Edition* (Geneva: World Health Organization, 2016).

[2] A. Sanaei *et al.*, "Optimization of Gelatin Extraction and Physico-Chemical Properties of Catfish *(Clarias gariepinus)* Bone Gelatin," *International Food Research Journal* 20, no. 1 (2013): 423–30.

tablet, and coating agent) [3]. and in veterinary applications [4].

The global market for gelatin had worth USD 1.77 billion in 2011 and expected to grow at a Compound Annual Growth Rate (CAGR) of 6.75% from 2012 to 2018. In terms of production, gelatins were produced around 348.9-kilo tonnes in 2011 globally and expected to reach 450.7-kilo tonnes in 2018 [5]. The Necessity of gelatin for a manufacturing industry in Indonesia is increasing each years, which makes it one of the import products. Last statistics noted that in the period from January to December 2009, the Government has been importing gelatin as much as 3,124 tons with import value until US $16,741,918. About 91,790 kg (2.94%) gelatin is used for the needs of the pharmaceutical industry [6].

Gelatin can be produced from halal or haram source. The annual world output of gelatin is nearly 326,000 tons, with pigskin derivatives at the lead (46%) bovine hides (29.4%), bones (23.1%), and other sources (1.5%) [7]. Since the burst of bovine spongiform encephalopathy (BSE), swine influenza, foot or mouth disease, and some religious restriction mainly among Moslem, Jewish, and Hindu [8], the utilization of gelatin based on other sources has gained a lot of attention. This research is looking for other alternatives as a source of gelatin. The fishbone gelatin is the prospective alternative to overcome these problems. It also can be accepted

[3] WHO, *The International Pharmacopoeia Sixth Edition*.

[4] KKP, *Informasi Kelautan dan Perikanan* (Jakarta: Dinas Kelautan dan Perikanan, 2012).

[5] D Ayuna, "Antara Ikan Salmon dan Ikan Kembung (Online Series)," Good News From Indonesia, 2017, https://www.goodnewsfromindonesia.id/2017/04/23/antara-ikan-salmon-dan-ikan-kembung.

[6] Achmad Mursyidi, "The Role of Chemical Analysis in the Halal Authentication of Food and Pharmaceutical Products," *Journal Food and Pharmaceutical Science* 1, no. 1 (2013): 1–4.

[7] Faidliyah Minah *et al.*, "Ekstraksi Gelatin dari Hidrolisa Kolagen Limbah Tulang Ikan Tuna Dengan Variasi Jenis Asam dan Waktu Ekstraksi," *SENIATI Institut Teknologi Nasional Malang*, 2016, 26–32.

[8] Stephanie Ata *et al.*, "Isolasi Kolagen dari Kulit dan Tulang Ikan Cakalang *(Katsuwonus pelamis)*," *Journal of Pharmaceutical and Medicinal Sciences* 1, no. 1 (2016): 27–30.

by all consumer Moslem, Hindu and Jewish [9]. The gelatin derived from fish (sea product) or halal-slaughtered animals, it is halal [10]. Halal gelatin from sea product can be produced from fish skin, fish scales, and fishbone. Some researchers have done the studies of gelatin derived from fishbones such as Tuna [11], Skipjack tuna fish [12], Catfish [13], Cakalang [14], Nile and others.

Indonesian fishery production in 2015 reached 6.2 million tons of small pelagic species donated most [15]. One of small pelagic fish is Short Mackerel *(Rastrelliger brachysoma)*. Short Mackerel is the 3rd commodity with the highest production volume under the Scad fish (405,808 tons) and Cakalang (372,211 tons). According to Department of Fisheries and Marine data, Indonesian production volume of Short Mackerel in 2011 is 291,863 tons [16]. If it is calculated, 291,863 tons of Short Mackerel will obtain 14,593 tons of fishbone and produced 1,751 tons of gelatin production.

The great quantities of raw material from Short Mackerel bone make the high potential for gelatin manufacturing. These are providing the great opportunities to manufacturing industry especially for food and pharmaceutical industries in Indonesia. Most of Short Mackerel products are utilizing the meat of fish only, while the head, fins, skin, and bones

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[9] Ata *et al.*

[10] N Mian and M Chaudhry, *Halal Food Production* (New York: CRC Press, 2003).

[11] Minah *et al.,* "Ekstraksi Gelatin dari Hidrolisa Kolagen Limbah Tulang Ikan Tuna dengan Variasi Jenis Asam dan Waktu Ekstraksi."

[12] Ata *et al.*, "Isolasi Kolagen dari Kulit dan Tulang Ikan Cakalang (*Katsuwonus pelamis*)."

[13] Dhian Prihardhani and Yunianta, "Ekstraksi Gelatin Kulit Ikan Lencam *(Lethrinus sp.)* dan Aplikasinya untuk Produk Permen Jeli," *Jurnal Pangan dan Agroindustri* 4, no. 1 (2016): 356–66.

[14] Ahmad Ridhay *et al.*, "The Effect of Variation of the Type of Acid on Gelatine Yield from Cakalang Fish Bone *(Katsuwonus pelamis),*" *KOVALEN* 2, no. September (2016): 44–53.

[15] BPS, "Badan Pusat Statistik : Produksi Perikanan Tangkap Menurut Provinsi dan Subsektor (Ton), 2000-2015 (Online Series)," 2017, https://bps.go.id/linkTabelStatis/view/id/1705.

[16] Marsaid, *"Efek Asam Terhadap Sifat Termal Ekstrak Gelatin dari Tulang Ikan Tuna (Euthynus affinis)*" (Surabaya, 2011).

untapped optimally. Therefore, research of the gelatin extracted from Short Mackerel bone as one of the additive alternatives that acceptable throughout the community. So the utilization of Short Mackerel bone into gelatin product becomes very important to do. The main purpose of the study is to utilize waste of Short Mackerel bone into halal gelatin product. The gelatin will be characterized in gelatin identification using Fourier Transform Infrared Spectroscopy (FTIR), gelatin yield, moisture level, pH level, viscosity, gel strength, and halal gelatin identification.

1.2. Formulation of the Research Problem

Based on the background research as mentioned above, it is necessary to formulate some research questions as follows :

1. How does the potential of the Short Mackerel *(Rastrelliger brachysoma)* bone to become one of the alternative sources to produce halal gelatin?
2. How is the influence of using different acid solution in Short Mackerel *(Rastrelliger brachysoma)* bone with gelatin characterization (moisture level, pH level, viscosity, and gel strength)?

1.3. Objectives of Research

The general objective of this research is to produce halal gelatin using the extract of Short Mackerel *(Rastrelliger brachysoma)* bone. The specific objectives of this study are :

1. To utilize Short Mackerel *(Rastrelliger brachysoma)* bone become one of the alternative sources to produce halal gelatin
2. To identify the influence of using different acid solution in Short Mackerel *(Rastrelliger brachysoma)* bone with gelatin characterization (moisture level, pH level, viscosity, and gel strength)

1.4. Benefits of Research

The benefits of this research are :

1. Theoretically, the result of this research is expected to be a reference for the development of halal gelatin manufacture.
2. Practically, the result of this research is to utilize the waste of Short Mackerel *(Rastrelliger brachysoma)* bone become one of the alternative sources to produce halal gelatin as well as reduce the fishbone waste

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