

Chapter 14

Camel Gelatin Composition, Properties, Production, and Applications

Irwandi Jaswir

International Islamic University Malaysia, Malaysia

Hassan Abdullah Al-Kahtani

King Saud University, Saudi Arabia

Fitri Octavianti

Avicenna Dental Clinic, Malaysia

Widya Lestari

International Islamic University Malaysia, Malaysia

Nurlina Yusof

International Islamic University Malaysia, Malaysia

ABSTRACT

Gelatin is an important protein produced through partial hydrolysis of collagen from animal parts and byproducts such as cartilage, bones, tendons, and hides. The ability of gelatin to form a thermo-reversible gel at normal body temperature and high water content make it an exceptional food ingredient. A good quality gelatin is translucent, brittle, colorless (sometimes slightly yellow), bland in taste, and odorless. Gelatin has been found useful as stabilizer and filler in dairy products and other food industries. Recently, the global gelatin production net over 300,000 metric tons: 46% were from pigskin, 29.4% from bovine hides, 23.1% from bones, and 1.5% from other parts. Although camels have been recognized as source of meat and milk, utilization of camel bones and skins for gelatin production has not been fully explored. This chapter will discuss the processing of camel gelatin extraction.

INTRODUCTION

Gelatin is an important protein produced through partial hydrolysis of collagen from animal parts and byproducts such as cartilages, bones, tendons and hides. The ability of gelatin to form a thermo-reversible gel at normal body temperature and its ability to retain large amounts of water makes it a unique food ingredient. A good quality gelatin is translucent, brittle, colorless (sometimes slightly yellow), bland in taste and odorless. Gelatin has been found useful as a stabilizer and filler in dairy products (see Chapter 5) and other food industries (Mariod & Adam, 2013). Recently, the net global gelatin production was over 300,000 metric tons; 46% were from pigskin, 29.4% from bovine hides, 23.1% from bones and 1.5% from other parts or animals (Zilhada, Harahap, Jaswir, & Effionora, 2018). Although camels have been recognized as a source of meat (see Chapter 12 and 13) and milk (see Chapter 2), utilization of camel's bones and skins for gelatin production has not been fully explored.

Bone gelatin is primarily used for pharmaceutical purposes because of its high level of purity. Prior to extraction of gelatin from bone samples, the bones must be demineralized using dilute acid solution to remove inherent calcium that is part of the bone matrix (Harahap, Jaswir, & Anwar, 2016). Structurally, the function of calcium salt deposited in the organic matrix of bone is to maintain the bone integrity by holding the scaffolds and crosslinks that improves bone strength and rigidity. Removal of calcium salt from bone through acidulation with dilute acid is an essential step towards successful gelatin production since the results of the acid treatment produces bone protein (collagen) which contained water-soluble gelatin. Extraction temperature, pH and extraction period are common operating parameters influencing gelatin production (Gehan, El-Bassyouni, & Abdel-Fattah, 2013). The effect of processing conditions on the properties of gelatin from fish bone with pretreatment with hydrochloric acid has been reported (Taheri, Abedian Kenari, Gildberg, & Behnam, 2009). Adoption of specific processing parameters and raw material sources often improve the consistency in functionality of gelatin or collagen.

Recently, there has been increase interest in the effective use of underutilized resources and industrial wastes to reduce production cost and environmental hazards. Utilization of animal bone for gelatin production offers opportunities including waste to wealth and waste minimization.

Gelatins from bovine and porcine sources are becoming less acceptable because of increasing allergen cases and tradition or religious believes. This has called for production of gelatin from other sources. Therefore, camel bone gelatin can be a good alternative source of gelatin. However, there has been less effort to identify processing conditions for demineralization of camel bone. The developed demineralization processing conditions for cattle bone are kept as company secret, and conflicting values have been reported. This Chapter will discuss various aspects of the processing of gelatin, particularly camel gelatin extraction, regulations and standards, physico-chemical characteristics, as well as the application of gelatins.

MANUFACTURING OF GELATIN

The typical commercial sources of gelatin are of mammalian origin, mainly pigs and cows. Their bones, skins, and hides are used. Gelatin from these sources form strong gels with good properties. However, there has been a rise in concerns that gelatin might transmit diseases such as mad cow disease and for

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