

**APPLICATION OF CHICKEN FEET GELATIN
INCORPORATED WITH LEMONGRASS EXTRACT AS
FOOD PACKAGING**

NURNAJIHAH FARHANI BINTI AZHAR

**BACHELOR OF SCIENCE (Hons.) APPLIED
CHEMISTRY FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA**

AUGUST 2024



UNIVERSITI
TEKNOLOGI
MARA

Fakulti
Sains Gunaan

**SUBMISSION FOR EVALUATION
FINAL YEAR PROJECT 2 - RESEARCH PROJECT**

APPLICATION OF CHICKEN FEET GELATIN INCOPORATED WITH
LEMONGRASS EXTRACT AS FOOD PACKAGING

Name : NURNAJIHAH FARHANI BINTI AZHAR
Student ID : 2021899556
Program : APPLIED CHEMISTRY
Course code : AS245
Mobile Phone :
E-mail : najihahfarhaniashar@gmail.com

Approval by Main Supervisor :

I certify that the work conducted by the above student is completed and approve this report to be submitted for evaluation.

Supervisor's name : SALAMIAH BINTI ZAKARIA
Date : 28/7/2024
Turnitin Similarity % : 23%
Signature :

**APPLICATION OF CHICKEN FEET GELATIN INCORPORATED WITH
LEMONGRASS EXTRACT AS FOOD PACKAGING**

NURNAJIHAH FARHANI BINTI AZHAR

**Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Applied Chemistry
in the Faculty of Applied Sciences
Universiti Teknologi MARA**

28 JULY 2024

ABSTRACT

APPLICATION OF CHICKEN FEET GELATIN INCORPORATED WITH LEMONGRASS EXTRACT AS FOOD PACKAGING

The widespread utilization and improper disposal of non-biodegradable synthetic plastics cause significant environmental challenges, demanding the requirement for sustainable packaging alternatives. Chicken feet, which are a byproduct of the poultry industry, contain a substantial amount of gelatin which provides a biodegradable and renewable alternative suitable for food packaging, but it has challenges in preserving its structural integrity. Lemongrass, recognized for its potent antioxidant and antibacterial characteristics, can improve the efficacy of gelatin. This study aims to study the potential applications of chicken feet gelatin (CFG) incorporated with lemongrass extract (LGE) by performing tests for antioxidant and antibacterial activity, and preservation studies on sausages and grapes. This study involved the extraction of CFG and lemongrass, then the CFG was combined with different concentrations of LGE (10, 20, and 30 w/w). The incorporated solution was analyzed using FTIR analysis, pH testing, and percentage yield (%) assessment to determine its chemical composition and characteristics. The antioxidant value of LGE and CFG with varying LGE concentrations was assessed through DPPH radical scavenging activity using a UV-Vis spectrophotometer, while antibacterial tests were conducted against Gram-positive and Gram-negative bacteria, including *Salmonella* and *Staphylococcus aureus*. The preservation studies evaluated the weight loss of grapes and sausages over 10 days under different conditions, including at room temperature and in a chiller, as well as the browning index of grapes. The result showed that the CFG incorporated with LGE (30w/w) show the highest radical scavenging value in antioxidant test which is 58.1590% and it has largest inhibition zone in the antibacterial susceptibility test against *Salmonella* and *Staphylococcus aureus* which are 11.00 ± 1.0 and 14.00 ± 1.0 respectively. Both sausages and grapes coated with CFG incorporated with LGE (30w/w) in chiller show the least percentage weight loss with the value of 51.33% and 2.69% correspondingly. The grapes coated with CFG incorporated with LGE (30w/w) in chiller has no browning due to the developed antioxidant and antibacterial properties of the gelatin coating combined with lemongrass extract, which helped control oxidative reactions and microbial growth, thus preserving the quality of the grape. Hence, this indicate the high antioxidant and antibacterial properties have led to significant reduction of weight loss of sausages and grapes and low browning index of grapes. In conclusion, the antioxidant and antibacterial properties of chicken feet gelatin are improved significantly by the incorporation of lemongrass extract, thereby extending the shelf life of food products. This show its potential as a biodegradable packaging material that is suitable for industrial applications, providing a sustainable alternative to conventional packaging.

TABLE OF CONTENT

	Page
ABSTRACT	ii
ABSTRAK	iii
ACKNOWLEDGMENTS	iv
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF SYMBOLS	ix
LIST OF ABBREVIATION	x
CHAPTER 1	1
1.1 Background of study	1
1.2 Problem statement	4
1.3 Significance of study	5
1.4 Objectives of study	6
CHAPTER 2	7
2.1 Introduction to gelatin	7
2.2 Sources of gelatin	8
2.3 Overview of poultry gelatin	10
2.4 Active ingredients for incorporation with gelatin	12
2.5 The impact of lemongrass extract on the properties of the gelatin films	14
2.6 Overview of gelatin-based biodegradable food packaging	16
CHAPTER 3	20
3.1 Materials and chemicals	20
3.1.1 Raw materials	20
3.1.2 Chemicals	20
3.1.3 Apparatus and instrument	20
3.2 Method	21
3.2.1 Defatting the chicken feet	21
3.2.2 Pre-treatment and extraction of chicken feet gelatin	21
3.2.3 The extraction of lemongrass	22
3.2.4 Modification of chicken feet gelatin with lemongrass extract	22
3.3 FTIR analysis	23
3.4 pH test	23
3.5 Antibacterial test (Disc diffusion method)	23
3.5.1 Preparation of nutrient broth	23
3.5.2 Preparation of bacteria culture at 0.5 MacFarland concentration	24
3.5.3 Preparation of bacteria culture on Muelle Hinton Agar	24
3.5.4 Test disc preparation	25
3.6 Antioxidant test	26
3.6.1 The preparation of DPPH stock solution 0.5mM	26
3.6.2 Determination of DPPH maximum wavelength and operating time	26
3.7 Preservation Studies	27
3.7.1 Preparation of coating on chicken sausages	27
3.7.2 Preparation of coating on grapes	28