

TABLE OF CONTENTS

TITLE PAGE	i
APPROVAL PAGE	iii
DECLARATION OF ACADEMIC INTEGRITY	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
ACRONYMS	xi
ABSTRACT	xii
CHAPTER I: INTRODUCTION	1
1.1 Background	1
1.2 Research Formulation	4
1.3 Research Objectives	5
1.3.1 General objective.....	5
1.3.2 Specific objectives	5
1.4 Significance of the study	5
CHAPTER II: LITERATURE REVIEW	7
2.1 Plant-Based Burger Patties	7
2.2 Tempeh as a Meat Alternative.....	7
2.3 Texture and Structural Challenges in Plant-Based Burger Patties	9
2.4 Texture Development Mechanisms in Plant-Based Burger Patties	10
2.4.1 Protein Network Formation and Gelation	10
2.4.2 Water Binding and Structural Stability	11
2.5 Role of Transglutaminase in Texture Modification of Meat Analogues	11
2.6 Role of Wheat Gluten in Structuring Meat Analog Texture	12
2.7 Role of Sodium Tripolyphosphate (STPP) in Texture Development	13
2.8 Interactive Effects of TGase, Wheat Gluten, and STPP in Protein-Based Systems.....	13
2.9 Sensory Analysis and Consumer Acceptability of Meat Analogues.....	16
2.10 Research Hypothesis	17
2.10.1 Specific Hypotheses.....	17
CHAPTER III: METHODOLOGY	18
3.1 Materials and Research Tools	18
3.2 Location and time of the study.....	19
3.3 Research Design	19
3.4 Preparation of Taro Flour and the Beetroot Juice	20

3.4.1 Preparation of Taro flour from Taro corms	20
3.4.2 Preparation of the beetroot juice	20
3.5 Formulation and Preparation of Tempeh-Based Burger Patties	21
3.5.1 Formulation	21
3.5.2 Tempeh-Based Burger Patty Preparation	22
3.6 Texture and Physicochemical analysis of tempeh-based burger patties	23
3.6.1 Texture Profile Analysis (TPA)	23
3.6.2 Determination of cooking parameters	23
3.6.3 Water Holding Capacity (WHC)	24
3.6.4 Determination of Moisture Content	25
3.6.5 Colour analysis	26
3.6.6 Sensory evaluation of the tempeh-based burger patties	26
3.6.6.1 Rate-All-That-Apply (RATA)	26
3.6.6.2 Overall Acceptability and Hedonic Evaluation	28
3.6.6.3 Panel, Samples, and Test Conditions	29
3.6.6.4 Selection of Panellists and Eligibility Criteria	29
3.6.6.5 Randomization of the samples	30
3.6.6.6 Procedure for sensory evaluation.	31
3.7 Statistical Analysis	31
3.8 Ethical considerations	32
CHAPTER IV: RESULTS AND DISCUSSION	33
4.1 Textural properties of Tempeh-based burger patties	33
4.2 Physicochemical Properties	36
4.2.1 Moisture content, water holding capacity, and cooking properties	36
4.2.2 Colour properties	39
4.3 Interaction effects of TGase, STPP, and gluten on texture development	41
4.3.1 Three-way ANOVA assessing the effects of TGase, STPP, and Wheat gluten	41
4.3.2 Visualization of interaction effects on texture development	43
4.4 Sensory evaluation	44
4.4.1 Demographic characteristics of consumer panellists	44
4.4.2 RATA sensory profile of tempeh-based burger patties	45
4.5 Correlation Analysis	46
4.5.1 Instrumental-Instrumental Relationships	46
4.5.2 Instrumental-Sensory Relationships	49
4.6 Hedonic Evaluation of tempeh-based burger patties	51
CHAPTER V: CONCLUSION AND RECOMMENDATIONS	54

5.1 Conclusion	54
5.2 Limitations of the Study	55
5.3 Recommendations for Future Research.....	55
REFERENCES.....	56
Ethical approval letter	77
SUPPLEMENTARY DATA	78
SENSORY QUESTIONNAIRE	79
Rate-All-That-Applly (RATA):	79
Hedonic Evaluation:	81