

## TABLE OF CONTENTS

|                                      | <b>Page</b> |
|--------------------------------------|-------------|
| ACKNOWLEDGEMENTS                     | iii         |
| ABSTRACT IN ENGLISH                  | v           |
| ABSTRACT IN THAI                     | vii         |
| LIST OF TABLES                       | xi          |
| LIST OF FIGURES                      | xii         |
| ABBREVIATIONS AND SYMBOLS            | xiii        |
| 1. INTRODUCTION AND OBJECTIVES       | 1           |
| 1.1 Introduction                     | 1           |
| 1.2 Objectives                       | 4           |
| 2. LITERATURE REVIEW                 | 5           |
| 2.1 <i>Salmonella</i>                | 5           |
| 2.1.1 Microbiology                   | 5           |
| 2.1.2 Serotyping                     | 5           |
| 2.2 Epidemiology                     | 6           |
| 2.3 Salmonellosis                    | 8           |
| 2.3.1 Salmonellosis in humans        | 8           |
| 2.3.2 Salmonellosis in animals       | 10          |
| 2.4 <i>Salmonella</i> Detection      | 13          |
| 2.4.1 Conventional methods           | 13          |
| 2.4.2. Alternative methods           | 14          |
| 2.4.2.1 Immunoassay-based methods    | 14          |
| 2.4.2.2 Genetic-based methods        | 14          |
| 3. MATERIALS AND METHODS             | 16          |
| 3.1 Study design                     | 16          |
| 3.2 Sample size and sample selection | 16          |
| 3.3 Sample collection                | 17          |

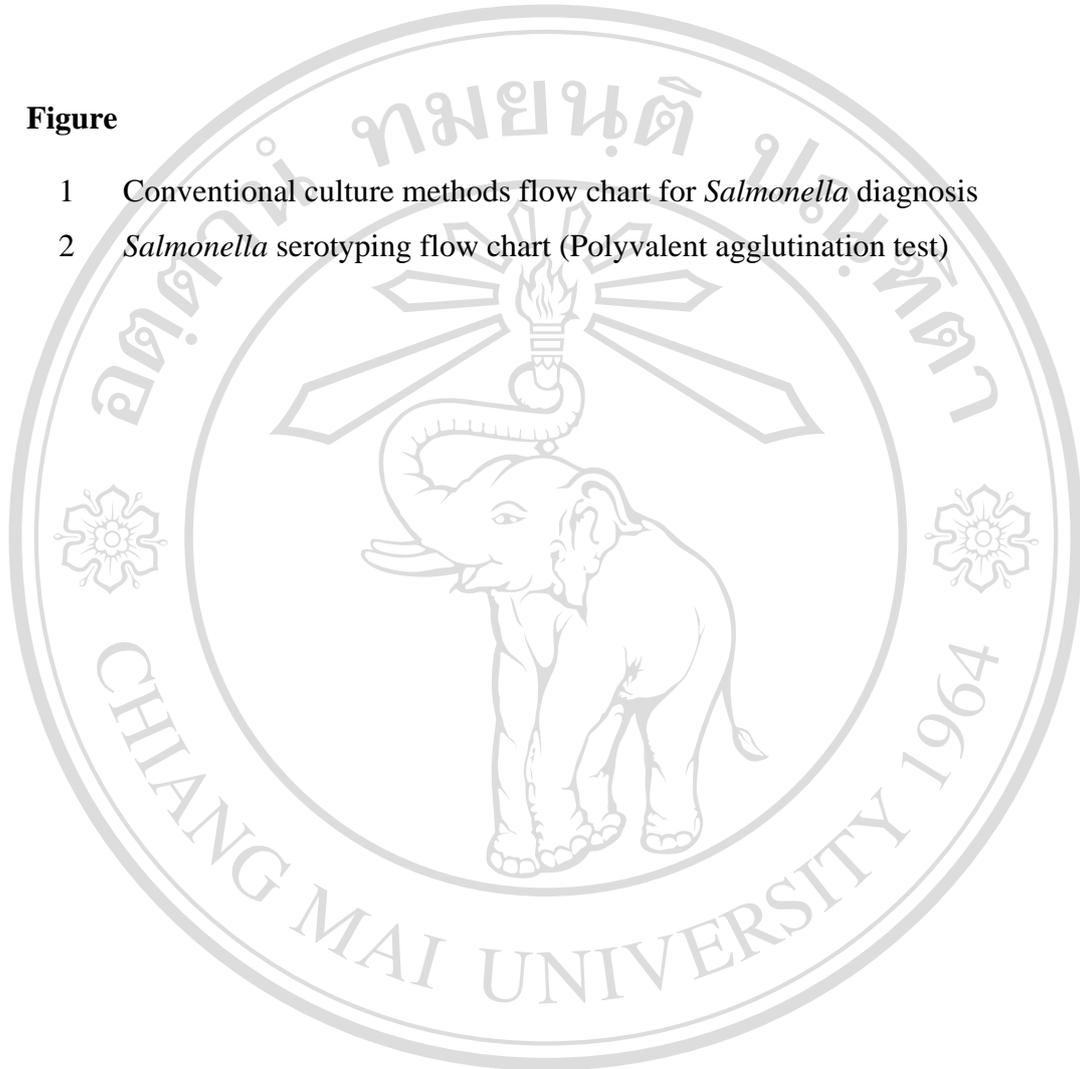
|  |    |
|--|----|
| 3.4 Laboratory procedure   | 18 |
| 3.4.1 Conventional Culture Method: ISO 6579 (2002)   | 18 |
| 3.4.2 Serotyping   | 20 |
| 3.5 Questionnaire for potential risk factors associated<br>with <i>Salmonella</i> flock prevalence | 22 |
| 3.6 Statistical Analysis   | 24 |
| 4. RESULTS   | 25 |
| 4.1 <i>Salmonella</i> Isolation  | 25 |
| 4.2 Results of <i>Salmonella</i> serotyping  | 26 |
| 4.3 Questionnaire results  | 29 |
| 5. DISCUSSION AND CONCLUSIONS  | 32 |
| 5.1 Discussion   | 32 |
| 5.2 Conclusion   | 35 |
| REFERENCES   | 37 |
| APPENDIX   | 42 |
| DECLARATION  | 45 |
| CURRICULUM VITAE   | 46 |

## LIST OF TABLES

| <b>Table</b>   | <b>Page</b> |
|--|-------------|
| 1 Present number of serovars in each <i>Salmonella</i> species and subspecies  | 6           |
| 2 Reported confirmed salmonellosis cases in humans in the EU<br>by serovars(10 most frequent serovars)   | 9           |
| 3 Top ten <i>Salmonella</i> serovars from human sources in Thailand 2006   | 10          |
| 4 Top-ten <i>Salmonella</i> serovars from animals in Thailand 2006   | 12          |
| 5 Proportion of <i>Salmonella</i> positive sample in each sample types<br>from broiler flocks  | 25          |
| 6 Distribution of prevalence of <i>Salmonella</i> spp. at broiler flocks level:<br>at one- day -old chicks and within three weeks before leaving for slaughter | 26          |
| 7 Distribution of <i>Salmonella</i> serogroups at difference ages of broiler flocks  | 27          |
| 8 Distribution of <i>Salmonella</i> Serogroups in broiler flocks by sample type  | 27          |
| 9 Distribution of <i>Salmonella</i> serotypes  | 28          |
| 10 Distribution of <i>Salmonella</i> serotypes at different ages of broiler<br>flocks and different sample type  | 28          |
| 11 General characteristic of flocks, house and husbandry/<br>management rearing in Chiang Mai and Lamphun provinces (71 flocks)                                | 30          |

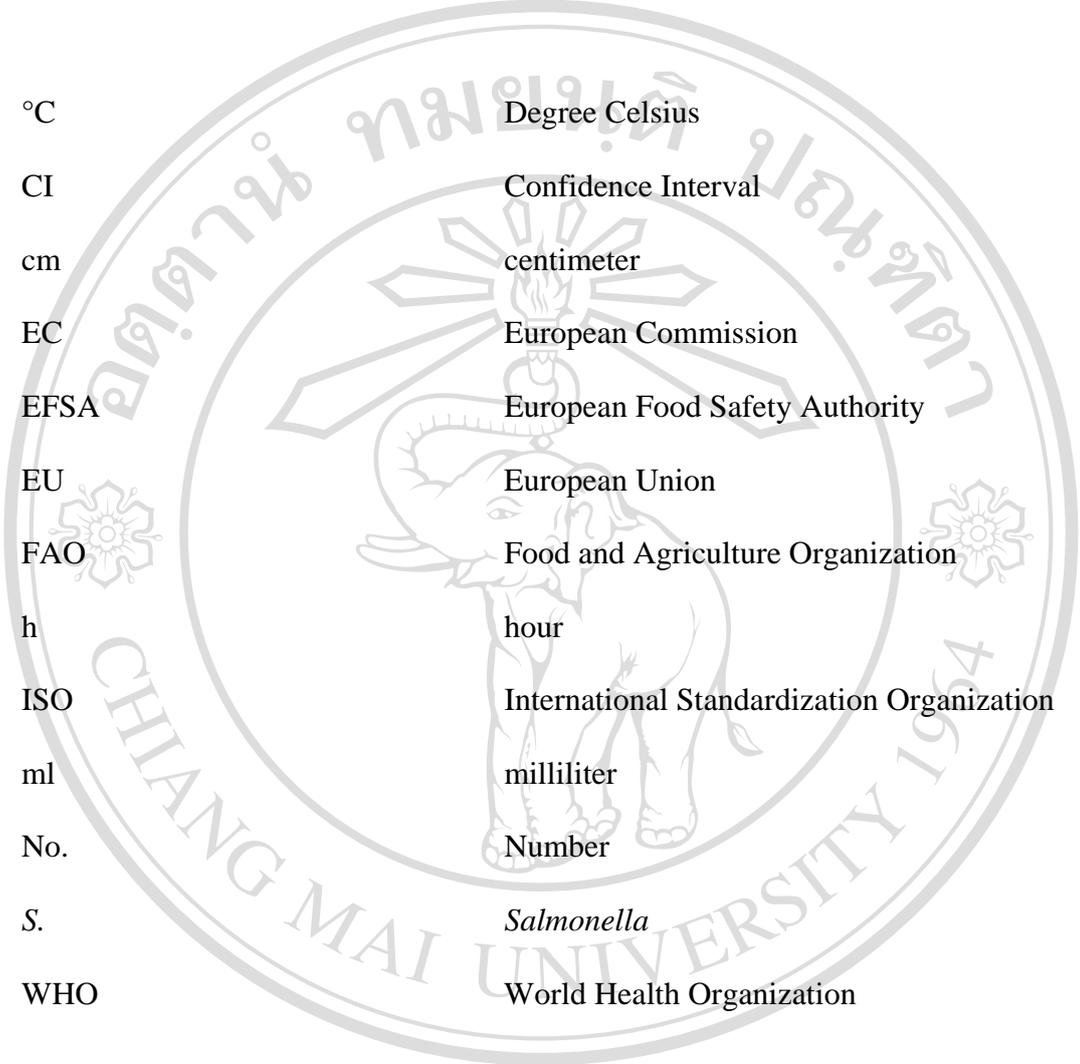
## LIST OF FIGURES

| Figure |   | Page |
|--------|---|------|
| 1      | Conventional culture methods flow chart for <i>Salmonella</i> diagnosis | 19   |
| 2      | <i>Salmonella</i> serotyping flow chart (Polyvalent agglutination test) | 22   |



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
 Copyright© by Chiang Mai University  
 All rights reserved

## ABBREVIATIONS AND SYMBOLS



|      |  |
|------|--|
| °C   | Degree Celsius                             |
| CI   | Confidence Interval                        |
| cm   | centimeter                                 |
| EC   | European Commission                        |
| EFSA | European Food Safety Authority             |
| EU   | European Union                             |
| FAO  | Food and Agriculture Organization          |
| h    | hour                                       |
| ISO  | International Standardization Organization |
| ml   | milliliter                                 |
| No.  | Number                                     |
| S.   | <i>Salmonella</i>                          |
| WHO  | World Health Organization                  |

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
 Copyright© by Chiang Mai University  
 All rights reserved