TABLE OF CONTENTS

2018	
	Page
F007	
ACKNOWLEDGEMENTS	iii
ABSTRACT IN ENGLISH	iv
ABSTRACT IN THAI	vi
LIST OF TABLES	xi
LIST OF FIGURES	xii
ABBREVIATIONS AND SYMBOLS	xiii
1. INTRODUCTION	1
2. LITERATURE REVIEW	3
2.1 Back-ground on Salmonella	3
2.1.1 Microbiology	3
2.1.2 Taxonomy	5
2.1.3 Serotyping	6
2.2 Epidemiology of Salmonella in pig production lines	7
2.3 Distribution of Salmonella in humans, Thailand	11
2.4 Salmonellosis	14
2.4.1 Swine salmonellosis	14
2.4.2 Human salmonellosis	14
2.5 Detection and identification of Salmonella	15
2.6 The pig production in Thailand	ve16ity
2.7 Sow management	19
2.8 Control of Salmonella in pigs	V 19 0

	Page
3. MATERIAL AND METHODS	21
3.1 Study design	21
3.2 Sample size determination	21
3.3 Study population	21
3.4 Sample selection	22
3.4.1 Animal samples	22
3.4.2 Environmental samples	22
3.5 Sample collection	24
3.5.1 Serum samples	24
3.5.2 Faecal samples	24
3.5.3 Skin swab samples	24
3.5.4 Pen swab samples	24
3.5.5 Water samples	25
3.6 Laboratory procedure	25
3.6.1 Serology: ELISA	25
3.6.2 Conventional culture method	27
3.6.3 Serotyping	30
3.7 Data management and analysis	32
4. RESULTS	33
4.1 Result of Salmonella Isolation and Serotyping	33
4.1.1 Result of <i>Salmonella</i> Isolation	33
4.1.2 Result of Salmonella Serotyping	37
4.2 Incidence of <i>Salmonella</i> in breeder sows4.3 Result of <i>Salmonella</i> antibodies testing	ve ₄₃ sity
from serum samples	Vec
4.4 Correlation between the numbers of Salmonella	44
isolates and ELISA results	

P	age
5. DISCUSSION AND CONCLUSIONS	46
5.1 Discussion	46
5.1.1 Materials and methods	46
5.1.2 Result of isolation	47
5.1.3 Serotypes of isolates	48
5.1.4 Incidence of Salmonella	49
5.1.5 Result of Salmonella antibodies testing	50
from serum samples	
5.1.6 Correlation between the numbers of Salmonella	51
isolations and ELISA results	1
5.2 Conclusions	51
REFERENCE	53
APPENDICES	60
Appendix A: Equipment, materials, media and reagents	60
Appendix B: Media preparation	63
Appendix C: Comparative of Salmonella serotypes with	
The other studies	65
Declaration	66
CURRICULUM VITAE	67

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่ Copyright[©] by Chiang Mai University All rights reserved

LIST OF TABLE

Table 9312126	Page
1. Biochemical characteristics of Salmonella	4
2. Salmonella species and subspecies	6
3. Example of antigenic structure formula for some Salmonella serovars	7
4. The prevalence of <i>Salmonella</i> in pigs	10
5. Distribution of Salmonella serotypes in pigs	10
6. The 10 common serotypes of Salmonella isolates from humans	
from 1993 to 2002, in Thailand (Bangtrakulnonth et al., 2004)	12
7. Top-ten Salmonella isolates from human	13
8. Total samples taken	23
9. Interpretation of biochemical test	28
10. Distribution of Salmonella isolates from sow by date	34
11. Distribution of Salmonella isolates from environmental samples	
by date	36
12. Percent proportion of Salmonella isolates in sows and environmental	
samples in comparison of open and close housing systems	37
13. Serogroups of Salmonella from positive samples	38
14. Distribution of Salmonella serotypes	39
15. Distribution of serotypes of Salmonella isolates separated by housing	39
16. Distribution of Salmonella serotypes of by group of samples	40
17. Distribution of <i>Salmonella</i> serotypes in open and close housing systems by date	e ₄₁
18. Serological results in comparison of open and close housing systems	44
19. Comparison of Salmonella isolation and the serological results	
at the individual pig level	45

LIST OF FIGURES

Fi	igure 91812100	Page
1.	Schematic representation of the antigen structure of Salmonella	
	shows the relative locations of O, H and Vi antigens	6
2.	Flowchart of integrated pig production lines in Thailand	18
3.	ELISA test flow chart	26
4.	Flow chart of Salmonella: Conventional culture methods	29
5.	Salmonella serotyping flow chart	31
6.	Salmonella positive in sow samples: open and close housing systems	35
7.	Incidence in breeder sows: open house	42
8.	Incidence in breeder sows: close house	43

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่ Copyright[©] by Chiang Mai University All rights reserved

ABBREVIATION AND SYMBOLS

micrometer μm Water activity aw $^{\rm o}C$ Celsius CI Confidence Interval Department of livestock development DLD **ELISA** Enzyme-linked immunosorbent assay et al. et alii gram h hour ISO International Standardization Organization kilogram kg milliliter ml Number No. Office International des Epizooties **OIE** S. Salmonella World Health Organization WHO % Percent Species Spp. Subspecies optical density Minutes FMD Foot and Month disease