APPENDICES

Appendix 1. Zone diameter interpretive Standards for *E. coli*
(Medium: on the medium Mueller-Hinton agar; Inoculum: growth method
equivalent to 0.5 McFarland standard; Incubation: 35°C, ambient air, 16–18 hours)

Antimicrobials (content - µg)	Zone inhibition diameters (mm)		
	Resistant ≤	Intermediate	Susceptible ≥
tetracycline, 30	14	15-18	19
oxytetracycline, 30	14	15-18	19
doxycycline, 30	12	13-15	16
trimethoprim, 5	10	11-15	16
sulphonamides, 300	12	13-16	17
Streptomycin, 10	11	12-14	15
neomycin, 30	13	14-17	18
gentamicin, 10	12	13-14	15
ampicillin,10	13	14-16	17
cephalothin, 30	14	15-17	18
norfloxacin, 10	12	13-16	17
orfloxacin, 5	12	13-15	16

(Source: NCCLS, table 2A-2I. 24 (1). January 2004)

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Appendix 2. Questionnaire

Appendix 2a. QUESTIONNAIRE (on the pig husbandry practice)

Remark:

1. This questionnaire is designed for the evaluation of factors relating to pig husbandry at the pig farms where pig is produced for supply to the Hanoi market, study purpose only.

2. Data and information gathered via this survey are maintained confidential.

3. There is only one appropriate answer to each question unless otherwise specified.

1. Date of survey: ……………………..

 2. Farmer's name: ……………………………………………

 3. Address: Suburban ☐   other province ☐

 4. Sex: Male ☐   Female ☐

5. Age …………..

 6. Professional training course in pig rearing: Yes ☐   No ☐

7. Number of experienced years in pig rearing: …………years?

8. Pig rearing model:

  Food salvage ☐   feedstuff ☐   Combined ☐

9. Size of farm (heads):

  <5 ☐   5-10 ☐   10-15 ☐   15-20 ☐   20-50 ☐   50-100 ☐   >100 ☐

10. Use antimicrobials in pig husbandry?

          Yes ☐   No ☐

11. If Yes, what do you use antimicrobials for?

 Growth promotion ☐   Treatment ☐   Treatment and prevention ☐

12. Choice of kinds of antimicrobials used for treatment based on:

     Experience ☐   Vet. prescription ☐   Lab-diagnosis ☐

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13. Dose based on:

Experience ☐   Manufacturer's guideline ☐   Vet. prescription ☐

14. Withdrawal time of antimicrobials based on:

Experience ☐   Manufacturer's ☐   Vet. prescription ☐   not any guide ☐

15. What will you do with expired antimicrobials?

Not use any more ☐   continue ☐   No idea ☐

16. Q1: Do you know about bacterial resistance from the use of antimicrobials?

Yes ☐   No ☐

17. Q2: If 'Yes'. That was a phenomenon such as a patient (tuberculosis) is not recovered when he is treated by the same antimicrobial which used to be effective to that disease at the same dose (acceptable dose):

Agree ☐   Not (at very high dose) ☐

18. Q3: Inappropriately used antimicrobials in food animals can lead to resistance in pathogens

Yes ☐   No ☐   No idea ☐

19. Other comments…………………………………………………………… ……

THANK YOU

Appendix 2b. QUESTIONNAIRE (on the meat selling practice)

Remark:

1. This questionnaire is designed for a survey on potential factors relating to antimicrobial resistance of bacteria isolated from retail fresh pork at the meat shops in Hanoi market, study purpose only.

2. Data and information gathered via this survey are maintained confidential.

3. There is only one appropriate answer to each question unless otherwise specified.

1. Sample date: …………….………

2. Address (district): ………..………….

3. Meat retailer's name: ……….………….………………………….

4. Residence: Inner city ☐   Suburban ☐   other province ☐

5. Sex: Male ☐   Female ☐

6. Age ………..

7. Professional training course in meat business: Yes ☐   No ☐

8. Number of experienced years in pork business: …………years?

9. Estimate amount of pork sold daily: ……….…...kg

10. Wrapping pork during the transport?

    Yes ☐   No ☐

11. Origin of meat from:

  Suburban district in Hanoi ☐   Neighboring provinces ☐

12. Types of meat sold at the same shop:

pork ☐   Chicken meat ☐   Beef ☐   Others ☐

13. Preservation of meat

    Natural ☐   Ice ☐

14. Other comments

……………………………………………………………………………………

THANK YOU

Appendix 3. Results of the questionnaire surveys

Appendix 3a. Distribution of selected factors related to the pig husbandry practice (n = 120)

Selected factors		No. farmers selected	% farmers selected	95 % CI
Farmer's sex	Male	59	49.2	[40.0, 58.4]
	Female	61	50.8	[41.6, 60.0]
Age	Up to 30	10	8.3	[4.3, 15.2]
	30-40	32	26.7	[19.2, 35.7]
	40-50	43	35.8	[27.4, 45.2]
	>50	35	29.2	[21.4, 38.3]
Knowledge of pig rearing	Yes	55	45.8	[36.8, 55.2]
	No	65	54.2	[44.9, 63.2]
Professional training	No	120	0.0	[0.1, 3.8]
Experience in pig rearing (year)	Up to 10	23	19.2	[12.8, 27.6]
	10-20	40	33.3	[25.2, 42.6]
	>20	57	47.5	[38.4, 56.8]
Pig rearing model	Food salvage	57	47.5	[38.4, 56.8]
	Feedstuff	16	13.3	[8.1, 21.0]
	Combination	47	39.2	[30.5, 48.5]

Appendix 3a (Continued). Distribution of selected factors related to the pig husbandry practice   (n = 120)

Selected factors		No. farmers selected	% farmers selected	95 % CI
Size of farm (head)	<5	35	29.2	[21.4, 38.3]
	5-10	34	28.3	[20.7, 37.4]
	11-15	12	10.0	[5.5, 17.2]
	16-20	15	12.5	[7.4, 20.1]
	21-25	11	9.2	[4.9, 16.2]
	26-50	5	4.2	[1.5, 9.9]
	51-100	7	5.8	[2.6, 12.1]
	>101	1	0.8	[0.1, 5.2]
Use antimicrobials in pig rearing	Yes	117	97.5	[92.3, 99.4]
	No	3	2.5	[0.7, 7.7]
Purpose of antimicrobial use	Growth promotion	1	0.9	[0.0, 5.4]
	Treatment	64	54.7	[45.3, 63.8]
	Treatment + prevention	52	44.4	[35.4, 53.9]

Appendix 3a (Continued). Distribution of selected factors related to the pig husbandry practice   (n = 120)

Selected factors		No. farmers selected	% farmers selected	95 % CI
Types of antimicrobials selected based on	Own experience	110	94.0	[87.6, 97.4]
	Veterinary prescription	7	6.0	[2.7, 12.9]
	Laboratory diagnosis	0	0.0	[0.1, 4.0]
Dose based on	Own experience	87	74.4	[65.3, 81.8]
	Manufacturer's guideline	29	24.8	[17.5, 33.8]
	Veterinary prescription	1	0.9	[0.0, 5.4]
Withdrawal time	Own experience	77	64.2	[54.9, 72.6]
	Manufacturer's guidelines	27	23.1	[16.0, 32.0]
	Veterinary prescription	1	0.9	[0.0, 5.4]
	Not	12	12.0	[7.0, 19.6]
Expired antimicrobials	Not use	40	34.2	[25.8, 43.6]
	Use	52	44.4	[35.4, 53.9]
	No idea	25	21.4	[14.6, 30.1]

Appendix 3a (Continued). Distribution of selected factors related to the pig husbandry practice (n = 120)

Selected factors		No. farmers selected	% farmers selected	95 % CI
Q1: Antimicrobial resistance known	Yes	37	30.8	[22.9, 40.0]
	No	83	69.2	[60.0, 77.1]
Q2: That's a phenomenon in which a patient not recovered when treated by the same antimicrobial which used to be effective to that disease at the acceptable dose	Yes	2	5.4	[0.9, 19.5]
	No	35	94.6	[80.5, 99.1]
Q3: Inappropriately used antimicrobials in animals leading to resistance	Agree	7	18.9	[8.6, 35.7]
	Not agree	17	46.0	[29.9, 62.9]
	No idea	13	35.1	[20.7, 52.9]
Assessment of awareness	True (Q2 and Q3)	1	2.7	[0.1, 15.8]
	False (Q2 or Q3 or both)	36	97.3	[84.2, 99.9]

Appendix 3b. Distribution of selected factors related to the meat selling practice

(n=141)

Factors		No. of meat-retailers selected	% meat-retailers selected	95 % CI
Residence of meat retailers	Urban	37	26.2	[19.4, 34.4]
	Suburbanan	96	68.1	[59.6, 75.5]
	Other provinces	8	5.7	[2.7, 11.2]
Sex	Male	21	14.9	[9.7, 22.1]
	Female	120	85.1	[77.9, 90.3]
Age	Up to 30	22	15.6	[10.2, 22.9]
	31-40	57	40.4	[32.4, 49.0]
	41-50	45	31.9	[24.5, 40.4]
	>51	17	12.1	[7.4, 18.9]
Professional training	Yes	7	5.0	[2.2, 10.4]
	No	134	95.0	[89.7, 97.8]
Experience in meat business (years)	Up to 10	58	41.1	[33.0, 49.7]
	11-20	54	38.3	[30.4, 46.9]
	>20	29	20.6	[14.4, 28.4]
Pork sold daily (kg)	Up to 100	98	69.5	[61.1, 76.8]
	101-200	40	28.4	[21.3, 36.7]
	>200	3	2.1	[0.6, 6.6]
Wrapped products	No	138	97.9	[93.4, 99.5]
	Yes*	3	2.1	[0.6, 6.6]
Preservation	No	141	100.0	[96.7,99.9]
Meat origin	Hanoi	79	56.0	[47.4, 64.3]
	Neighboring provinces	62	44.0	[35.7, 52.6]
Types of meat sold at shop	Pork only	96	65.3	[56.7, 72.9]
	Pork and others	49	34.8	[27.1, 43.3]

* wrapped by raining coasts or sack-cloth that washed perfunctorily

Appendix 4. Antimicrobial susceptibilities of *E. coli* isolated from retail fresh pork (n = 332)

Antimicrobials	Resistant		Intermediate		Susceptible	
	No. of isolates	% [95 % CI]	No. of isolates	% [95 % CI]	No. of isolates	% [95 % CI]
tetracycline	265	79.8 [75.0, 83.9]	16	4.8 [2.9, 7.9]	51	15.4 [11.8, 19.8]
doxycycline	194	58.4 [53.0, 63.8]	67	16.0 [12.3, 20.5]	71	25.6 [21.1, 30.7]
oxytetracycline	247	74.4 [69.3, 78.9]	15	15.0 % [11.4, 19.4]	70	21.1 [16.9, 26.0]
trimethoprim	203	61.1 [55.7, 66.4]	2	0.6 [0.1, 2.4]	127	38.3 [33.0, 43.7]
sulphonamides	230	69.3 [64.0, 74.1]	1	0.3 [0.0, 1.9]	101	30.4 [25.6, 35.7]
norfloxacin	14	4.2 [2.4, 7.1]	9	2.7 [1.3, 5.3]	309	93.1 [89.6, 95.5]
orfloxacin	13	3.9 [2.2, 6.8]	15	4.5 [2.6, 7.5]	304	91.6 [87.9, 94.2]

Appendix 4 (Continued). Antimicrobial susceptibilities of *E. coli* isolated from retail fresh pork   (n = 332)

Antimicrobials	Resistant		Intermediate		Susceptible	
	No. of isolates	% [95 % CI]	No. of isolates	% [95 % CI]	No. of isolates	% [95 % CI]
gentamicin	40	12.1 [8.8, 16.2]	2	0.6 [0.1, 2.4]	290	87.4 [83.2, 90.6]
streptomycin	142	42.8 [37.4, 48.3]	53	16.0 [12.9, 20.5]	137	41.3 [36.0, 46.8]
neomycin	66	19.9 [15.8, 24.7]	75	22.6 [18.3, 27.6]	191	57.5 [52.0, 62.9]
ampicillin	179	53.9 [48., 59.4]	7	2.1 [0.9, 4.5]	146	44.0 [38.6, 49.5]
cephalothin	21	6.3 [4.1, 9.7]	38	11.5 [8.3, 15.5]	273	82.2 [77.6, 86.1]

Appendix 5. Antimicrobial resistance patterns of *E. coli* isolated from retail fresh pork

(n = 332)

Resistant types and antimicrobial resistance patterns	No. of resistant *E. coli* isolates	% resistant	95 % CI
No resistance	23	6.9	[4.5, 10.4]
Resistance against one antimicrobial	32	9.6	[6.8, 13.5]
AMP	15	4.5	[2.6, 7.5]
TE	6	1.8	[0.7, 4.1]
S3	5	1.5	[0.6, 3.7]
S10	2	0.6	[0.1, 2.4]
OT	1	0.3	[0.0, 1.9]
CN	1	0.3	[0.0, 1.9]
DO	1	0.3	[0.0, 1.9]
W	1	0.3	[0.0, 1.9]
Multi-resistance against two antimicrobials	16	4.8	[2.9, 7.9]
TE, OT	9	2.7	[1.3, 5.3]
AMP, TE	1	0.3	[0.0, 1.9]
AMP, S10	1	0.3	[0.0, 1.9]
AMP, N3	1	0.3	[0.0, 1.9]
AMP, OT	1	0.3	[0.0, 1.9]
TE, DO	1	0.3	[0.0, 1.9]
N, S3	1	0.3	[0.0, 1.9]
S10, S3	1	0.3	[0.0, 1.9]
Multi-resistance against three antimicrobials	26	7.8	[5.3, 11.4]
TE, OT, DO	14	4.2	[2.4, 7.1]
TE, OT, S3	2	0.6	[0.1, 2.4]
TE, W, S3	2	0.6	[0.1, 2.4]
TE, OT, N	1	0.3	[0.0, 1.9]
TE, OT, S10	1	0.3	[0.0, 1.9]
TE, OT, AMP	1	0.3	[0.0, 1.9]
TE, DO, W	1	0.3	[0.0, 1.9]
TE, W, AMP	1	0.3	[0.0, 1.9]
W, S3, AMP	1	0.3	[0.0, 1.9]
W, KF, AMP	1	0.3	[0.0, 1.9]
TE, S3, AMP	1	0.3	[0.0, 1.9]

Appendix 5 (Continued). Antimicrobial resistance patterns of *E. coli* isolated from

retail fresh pork   (n = 332)

Resistant types and antimicrobial resistance patterns	No. of resistant *E. coli* isolates	% resistant	95 % CI
Multi-resistance against four antimicrobials	35	10.5	[7.6, 14.5]
TE, OT, DO, S3	8	2.4	[1.1, 4.9]
TE, OT, S3, W	8	2.4	[1.1, 4.9]
TE, OT, DO, AMP	4	1.2	[0.4, 3.3]
TE, OT, DO, S10	2	0.6	[0.1, 2.4]
W, S3, S10, AMP	2	0.6	[0.1, 2.4]
TE, OT, S3, KF	2	0.6	[0.1, 2.4]
TE, OT, AMP, W	1	0.3	[0.0, 1.9]
TE, OT, S3, AMP	1	0.3	[0.0, 1.9]
TE, W, S3, N30	1	0.3	[0.0, 1.9]
TE, W, S3, AMP	1	0.3	[0.0, 1.9]
OT, W, S3, S10	1	0.3	[0.0, 1.9]
W, S3, AMP, KF	1	0.3	[0.0, 1.9]
W, S3, OFX, AMP	1	0.3	[0.0, 1.9]
OT, W, AMP, KF	1	0.3	[0.0, 1.9]
W, S10, AMP, KF	1	0.3	[0.0, 1.9]
Multi-resistance against five antimicrobials	40	12.0	[8.8, 16.2]
TE, OT, S3, DO, W	15	4.5	[2.6, 7.5]
TE, OT, S3, N, W	5	1.5	[0.6, 3.7]
TE, OT, S3, DO, S10	4	1.2	[0.4, 3.3]
TE, OT, S3, DO, AMP	3	0.9	[0.2, 2.8]
TE, OT, S3, S10, AMP	3	0.9	[0.2, 2.8]
TE, S10, S3, DO, W	1	0.3	[0.0, 1.9]
TE, AMP, S3, DO, W	1	0.3	[0.0, 1.9]
TE, OT, AMP, DO, W	1	0.3	[0.0, 1.9]
TE, OT, S3, KF, W	1	0.3	[0.0, 1.9]
TE, OT, S3, S10, W	1	0.3	[0.0, 1.9]
TE, OT, S3, AMP, W	1	0.3	[0.0, 1.9]
TE, OT, S3, S10, AMP	1	0.3	[0.0, 1.9]
TE, W, N, AMP, KF	1	0.3	[0.0, 1.9]
TE, OT, N, AMP, KF	1	0.3	[0.0, 1.9]
TE, OT, DO, AMP, KF	1	0.3	[0.0, 1.9]
OT, S3, W, S10, AMP	1	0.3	[0.0, 1.9]

Appendix 5 (Continued). Antimicrobial resistance patterns of *E. coli* isolated from

retail fresh pork (n = 332)

Resistant types and antimicrobial resistance patterns	No. of resistant *E. coli* isolates	% resistant	95 % CI
Multi-resistance against six antimicrobials	57	17.2	[13.4, 21.8]
TE, OT, AMP, W, S3, S10	13	3.9	[2.2, 6.8]
TE, OT, DO, W, S3, S10	13	3.9	[2.2, 6.8]
TE, OT, DO, W, S3, N	10	3.0	[1.5, 5.7]
TE, OT, DO, W, S3, S10	5	1.5	[0.6, 3.7]
TE, OT, DO, AMP, S3, S10	5	1.5	[0.6, 3.7]
TE, OT, DO, W, S3, CN	1	0.3	[0.0, 1.9]
TE, OT, DO, W, AMP, KF	1	0.3	[0.0, 1.9]
TE, OT, W, S3, N, AMP	1	0.3	[0.0, 1.9]
TE, DO, W, S10, N, CN	1	0.3	[0.0, 1.9]
TE, DO, W, S3, S10, AMP	1	0.3	[0.0, 1.9]
TE, OT, W, S3, S10, AMP	1	0.3	[0.0, 1.9]
DO, S3, S10, N,AMP, CN	1	0.3	[0.0, 1.9]
TE, OT, DO, AMP, KF, S10	1	0.3	[0.0, 1.9]
TE, OT, W, S10, N, AMP	1	0.3	[0.0, 1.9]
TE, DO, S3, S10, N, AMP	1	0.3	[0.0, 1.9]
OT, DO, W, S3, S10, AMP	1	0.3	[0.0, 1.9]
Multi-resistance against seven antimicrobials	54	16.3	[12.6, 20.8]
TE, OT, DO, S3, W, AMP, S10	31	9.3	[6.5, 13.1]
TE, OT, DO, S3, W, N, S10	3	0.9	[0.2, 2.8]
TE, OT, DO, S3, W, AMP, N	3	0.9	[0.2, 2.8]
TE, OT, DO, S3, W, AMP, NOR	3	0.9	[0.2, 2.8]
TE, OT, DO, S3, W, CN, S10	2	0.6	[0.1, 2.4]
TE, OT, DO, S3, N, AMP, S10	1	0.3	[0.0, 1.9]
TE, OT, N, S3, W, AMP, S10	1	0.3	[0.0, 1.9]
TE, DO, S3, W, AMP, S10, KF	1	0.3	[0.0, 1.9]
TE, OT, CN, S3, W, AMP, S10	1	0.3	[0.0, 1.9]
TE, OT, DO, S3, W, NOR, S10	1	0.3	[0.0, 1.9]
TE, OT, DO, S3, W, AMP, KF	1	0.3	[0.0, 1.9]
TE, OT, DO, S3, W, AMP, OFX	1	0.3	[0.0, 1.9]

Appendix 5 (Continued). Antimicrobial resistance patterns of *E. coli* isolated from

retail fresh pork (n = 332)

Resistant types and antimicrobial resistance patterns	No. of resistant *E. coli* isolates	% resistant	95 % CI
Multi-resistance against seven antimicrobials (con't)			
TE, OT, S3, W, AMP, N, KF	1	0.3	[0.0, 1.9]
TE, OT, DO, S3, W, N, KF	1	0.3	[0.0, 1.9]
TE, OT, DO, S3, W, N, CN	1	0.3	[0.0, 1.9]
Multi-resistance against eight antimicrobials	34	10.2	[7.3, 14.1]
TE, OT, DO, S3, W, S10, CN, AMP	9	2.7	[1.3, 5.3]
TE, OT, DO, S3, W, S10, N, AMP	7	2.1	[0.9, 4.5]
TE, OT, S3, W, S10, CN, AMP, N	3	0.9	[0.2, 2.8]
TE, OT, DO, S3, W, S10, CN, N	3	0.9	[0.2, 2.8]
TE, OT, DO, S3, W, S10, NOR, OFX	2	0.6	[0.1, 2.4]
TE, OT, DO, S3, W, N, KF, AMP	1	0.3	[0.0, 1.9]
TE, OT, DO, S3, W, S10, N, KF	1	0.3	[0.0, 1.9]
TE, OT, DO, S3, W, S10, AMP, KF	1	0.3	[0.0, 1.9]
TE, OT, DO, S3, W, S10, AMP, NOR	1	0.3	[0.0, 1.9]
TE, OT, DO, S3, W, S10, AMP, OFX	1	0.3	[0.0, 1.9]
TE, OT, S3, W, S10, CN, AMP, KF	1	0.3	[0.0, 1.9]
TE, OT, DO, S3, W, CN, AMP, OFX	1	0.3	[0.0, 1.9]
TE, DO, S3, W, S10, CN, AMP, N	1	0.3	[0.0, 1.9]
OT, DO, S3, W, S10, CN, AMP, N	1	0.3	[0.0, 1.9]
TE, OT, DO, S3, S10, CN, AMP, N	1	0.3	[0.0, 1.9]
Multi-resistance against nine antimicrobials	12	3.6	[2.0, 6.4]
TE, OT, DO, W, S3, AMP, S10, CN, N	5	1.5	[0.6, 3.7]
TE, OT, DO, W, S3, AMP, S10, NOR, OFX	2	0.6	[0.1, 2.4]
TE, OT, DO, W, S3, AMP, S10, N, NOR	1	0.3	[0.0, 1.9]

Appendix 5 (Continued). Antimicrobial resistance patterns of *E. coli* isolated from

retail fresh pork (n = 332)

Resistant types and antimicrobial resistance patterns	No. of resistant *E. coli* isolates	% resistant	95 % CI
Multi-resistance against nine antimicrobials (con't)			
TE, OT, DO, W, S3, AMP, S10, CN, OFX	1	0.3	[0.0, 1.9]
TE, OT, DO, W, S3, AMP, S10, CN, KF	1	0.3	[0.0, 1.9]
TE, OT, DO, W, S3, AMP, N, NOR, OFX	1	0.3	[0.0, 1.9]
TE, DO, W, S3, AMP, S10, CN, OFX, KF	1	0.3	[0.0, 1.9]
Multi-resistance against 10 antimicrobials			
TE, OT, DO, S3, W, NOR, OFX, CN, S10, AMP	1	0.3	[0.0, 1.9]
Multi-resistance against 11 antimicrobials			
TE, OT, DO, S3, W, NOR, OFX, CN, S10, N, AMP	2	0.6	[0.1, 2.4]

(TE - tetracycline, OT - oxytetracycline, DO - doxycycline, W - trimethoprim, S3 - sulphonamides, S10 - streptomycin, N - neomycin, CN - gentamicin, AMP - ampicillin, KF - cephalothin, NOR - norfloxacin, OFX - orfloxacin)

Appendix 6. Analysis results of potential risk factors relating to resistance of *E. coli* isolated from retail fresh pork

Appendix 6a. The proportion of tetracycline resistant *E. coli* isolates and the analysis of potential risk factors   (n = 332)

Factors		No. of isolates (n)	No. of resistant isolates	% resistant isolates (95 % CI)	Chi-square test p-value (α=0.05)	Odds ratio (95 % CI)
Pork sold daily (kg)	Up to 100	231	184	79.7 [73.8, 84.5]	0.909	0.97 [0.54, 1.73]
	>100	101	81	80.2 [70.8, 87.2]		
Wrapped products during transport	Yes	8	7	87.5* [51.9, 98.7]	1.000**	1.79 [0.22, 14.81]
	No	324	258	79.6 [74.7, 83.8]		
Meat origin	Hanoi suburban area	224	174	77.7 [71.6, 82.8]	0.210	0.65 [0.35, 1.19]
	Neighboring provinces	108	91	84.3 [75.7, 90.3]		
Types of meat sold at shop	Pork only	240	191	79.6 [73.8, 84.4]	0.984	0.95 [0.52, 1.73]
	Pork and others	92	74	80.4 [70.6, 87.7]		

*95 % CI adapted from Bunke (1959); **p-value for the Fisher's exact test

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Appendix 6b. The proportion of oxytetracycline resistant *E. coli* isolates and the analysis of potential risk factors (n = 332)

Factors		No. of isolates (n)	No. of resistant isolates	% resistant isolates (95 % CI)	Chi-square test p-value (α=0.05)	Odds ratio (95 % CI)
Pork sold daily (kg)	Up to 100	231	174	75.3 [69.2, 80.6]	0.654	1.17 [0.69, 1.99]
	>100	101	73	72.3 [62.3, 80.5]		
Wrapped products during transport	Yes	8	7	87.5* [51.9, 98.7]	0.685**	2.45 [0.30, 20.21]
	No	324	240	74.1 [68.9, 78.7]		
Meat origin	Hanoi suburban area	224	163	72.8 [66.4, 78.4]	0.398	0.76 [0.44, 1.31]
	Neighboring provinces	108	84	77.8 [68.6, 85.0]		
Types of meat sold at the same shop	Pork only	240	176	73.3 [67.2, 78.7]	0.564	0.81 [0.46, 1.43]
	Pork and others	92	71	77.2 [67.0, 85.0]		

*95 % CI adapted from Bunke (1959); **p-value for the Fisher's exact test

Appendix 6c. The proportion of doxycycline resistant *E. coli* isolates and the analysis of potential risk factors   (n=332)

Factors		No. of isolates (n)	No. of resistant isolates	% resistant isolates (95 % CI)	Chi-square test p-value (α=0.05)	Odds ratio (95 % CI)
Pork sold daily (kg)	Up to 100	231	142	61.5 [54.8, 67.7]	0.115	1.50 [0.94, 2.41]
	>100	101	52	51.5 [41.4, 61.5]		
Wrapped products during transport	Yes	8	4	50.00* [22.5, 77.5]	0.723**	0.71 [0.17, 2.87]
	No	324	190	58.6 [53.05, 64.02]		
Meat origin	Neighboring provinces	108	72	66.7 [56.9, 75.3]	0.046	1.67 [1.04, 2.70]
	Hanoi suburban area	224	122	54.5 [47.70, 61.07]		
Types of meat sold at the same shop	Pork only	240	143	59.58 [53.1, 65.8]	0.574	1.19 [0.73, 1.93]
	Pork and others	92	51	55.4 [44.7, 65.7]		

*95 % CI adapted from Bunke (1959); **p-value for the Fisher's exact test

Appendix 6d. The proportion of trimethoprim resistant *E. coli* isolates and the analysis of potential risk factors (n = 332)

Factors		No. of isolates (n)	No. of resistant isolates	% resistant isolates (95 % CI)	Chi-square test p-value (α=0.05)	Odds ratio (95 % CI)
Pork sold daily (kg)	Up to 100	231	144	62.3 [55.7, 68.5]	0.581	1.18 [0.73, 1.90]
	>100	101	59	58.4 [48.2, 68.0]		
Wrapped products during transport	Yes	8	7	87.5* [51.9, 98.7]	0.157**	4.57 [0.56, 37.60]
	No	324	196	60.5 [54.9, 65.8]		
Meat origin	Neighboring provinces	108	75	69.4 [59.7, 77.8]	0.042	1.70 [1.05, 2.79]
	Hanoi suburban area	224	128	57.1 [50.4, 63.7]		
Types of meat sold at the same shop	Pork only	240	147	61.3 [54.7, 67.4]	0.950	1.02 [0.62, 1.66]
	Pork and others	92	56	60.9 [50.1, 70.7]		

*95 % CI adapted from Bunke (1959); **p-value for the Fisher's exact test

Appendix 6e. The proportion of sulphonamide resistant *E. coli* isolates and the analysis of potential risk factors (n=332)

Factors		No. of isolates (n)	No. of resistant isolates	% resistant isolates (95 % CI)	Chi-square test p-value (α=0.05)	Odds ratio (95 % CI)
Pork sold daily (kg)	Up to 100	231	163	70.6 [64.2, 76.3]	0.523	1.22 [0.74, 2.01]
	>100	101	67	66.34 [56.2, 75.3]		
Wrapped products during transport	Yes	8	6	75.0* [38.8, 93.6]	1.000**	1.34 [0.27, 6.75]
	No	324	224	69.1 [63.8, 74.1]		
Meat origin	Hanoi suburban area	224	149	66.5 [59.9, 72.6]	0.149	0.66 [0.40, 1.11]
	Neighboring provinces	108	81	75.0 [65.6, 82.6]		
Types of meat sold at the same shop	Pork only	240	167	69.6 [63.28, 75.25]	0.950	1.05 [0.63, 1.77]
	Pork and others	92	63	68.5 [57.8, 77.6]		

*95 % CI adapted from Bunke (1959); **p-value for the Fisher's exact test

Appendix 6f. The proportion of streptomycin resistant *E. coli* isolates and the analysis of potential risk factors (n=332)

Factors		No. of isolates (n)	No. of resistant isolates	% resistant isolates (95 % CI)	Chi-square test p-value (α=0.05)	Odds ratio (95 % CI)
Pork sold daily (kg)	Up to 100	231	97	42.0 [35.6, 48.7]	0.754	0.90 [0.56, 1.44]
	>100	101	45	44.6 [34.8, 54.8]		
Wrapped products during transport	Yes	8	5	62.5* [27.8, 86.3]	0.295**	2.27 [0.53, 9.68]
	No	324	137	42.3 [36.9, 47.9]		
Meat origin	Neighboring provinces	108	57	52.8 [43.0, 62.4]	0.015	1.23 [1.15, 2.91]
	Hanoi suburban area	224	85	38.0 [31.6, 44.7]		
Types of meat sold at the same shop	Pork only	240	98	40.8 [34.6, 47.4]	0.304	0.75 [0.46, 1.22]
	Pork and others	92	44	47.8 [37.4, 58.4]		

*95 % CI adapted from Bunke (1959); **p-value for the Fisher's exact test

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Appendix 6g. The proportion of neomycin resistant *E. coli* isolates and the analysis of potential risk factors (n=332)

Factors		No. of isolates (n)	No. of resistant isolates	% resistant isolates (95 % CI)	Chi-square test p-value (α=0.05)	Odds ratio (95 % CI)
Pork sold daily (kg)	Up to 100	231	47	20.4 [15.5, 26.2]	0.863	1.10 [0.61, 1.99]
	>100	101	19	18.8 [12.0, 28.1]		
Wrapped products during transport	Yes	8	0	0.0* [0.0, 32.5]	0.365**	-
	No	324	66	20.4 [16.2, 25.3]		
Meat origin	Hanoi suburban area	224	41	18.3 [13.6, 24.1]	0.374	0.74 [0.42, 1.30]
	Neighboring provinces	108	25	23.2 [15.8, 32.4]		
Types of meat sold at the same shop	Pork only	240	46	19.2 [14.5, 24.8]	0.710	0.85 [0.47, 1.54]
	Pork and others	92	20	21.7 [14.1, 31.8]		

*95 % CI adapted from Bunke (1959); **p-value for the Fisher's exact test

Appendix 6h. The proportion of gentamycin resistant *E. coli* isolates and the analysis of potential risk factors (n=332)

Factors		No. of isolates (n)	No. of resistant isolates	% resistant isolates (95 % CI)	Chi-square test p-value (α=0.05)	Odds ratio (95 % CI)
Pork sold daily (kg)	Up to 100	231	30	13.0 [9.1, 18.2]	0.541	1.36 [0.64, 2.90]
	>100	101	10	9.9 [5.1, 17.9]		
Wrapped products during transport	Yes	8	1	12.5* [1.3, 48.1]	1.000**	1.04 [0.13, 8.71]
	No	324	39	12.0 [8.8, 16.2]		
Meat origin	Hanoi suburban area	224	25	11.2 [7.5, 16.2]	0.592	0.78 [0.39, 1.55]
	Neighboring provinces	108	15	13.9 [8.2, 22.2]		
Types of meat sold at the same shop	Pork only	240	29	12.1 [8.4, 17.1]	0.876	1.01 [0.48, 2.12]
	Pork and others	92	11	12.0 [6.4, 20.8]		

*95 % CI adapted from Bunke (1959); **p-value for the Fisher's exact test

Appendix 6i. The proportion of ampicillin resistant *E. coli* isolates and the analysis of potential risk factors (n=332)

Factors		No. of isolates (n)	No. of resistant isolates	% resistant isolates (95 % CI)	Chi-square test p-value (α=0.05)	Odds ratio (95 % CI)
Pork sold daily (kg)	Up to 100	231	125	54.1 [47.5, 60.6]	0.991	1.03 [0.64, 1.64]
	>100	101	54	53.5 [43.3, 63.4]		
Wrapped products during transport	Yes	8	6	75.0* [38.8, 93.6]	0.295**	2.62 [0.52, 13.17]
	No	324	173	53.4 [47.8, 58.9]		
Meat origin	Neighboring provinces	108	68	63.0 [53.1, 71.9]	0.029	1.73 [1.08, 2.77]
	Hanoi suburban area	224	111	49.6 [42.9, 56.3]		
Types of meat sold at the same shop	Pork only	240	128	53.3 [46.8, 59.8]	0.825	0.92 [0.57, 1.49]
	Pork and others	92	51	55.4 [44.7, 65.7]		

*95 % CI adapted from Bunke (1959); **p-value for the Fisher's exact test

Appendix 6k. The proportion of cephalothin resistant *E. coli* isolates and the analysis of potential risk factors (n=332)

Factors		No. of isolates (n)	No. of resistant isolates	% resistant isolates (95 % CI)	Chi-square test p-value (α=0.05)	Odds ratio (95 % CI)
Pork sold daily (kg)	Up to 100	231	15	6.5 [3.8, 10.7]	0.956	1.10 [0.41, 2.92]
	>100	101	6	5.9 [2.4, 13.0]		
Wrapped products during transport	Yes	8	1	12.5* [1.3, 48.1]	0.410**	2.17 [0.25, 18.52]
	No	324	20	6.2 [3.9, 9.5]		
Meat origin	Hanoi suburban area	224	15	6.7 [3.9, 11.0]	0.873	1.22 [0.46, 3.24]
	Neighboring provinces	108	6	5.6 [2.3, 12.2]		
Types of meat sold at the same shop	Pork only	240	17	7.1 [4.3, 11.3]	0.506**	1.64 [0.54, 5.01]
	Pork and others	92	4	4.4 [1.4, 11.4]		

*95 % CI adapted from Bunke (1959); **p-value for the Fisher's exact test

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Appendix 6l. The proportion of orfloxacin resistant *E. coli* isolates and the analysis of potential risk factors (n=332)

Factors		No. of isolates (n)	No. of resistant isolates	% resistant isolates (95 % CI)	Chi-square test p-value (α=0.05)	Odds ratio (95 % CI)
Pork sold daily (kg)	Up to 100	231	12	5.2 [2.8, 9.1]	0.131**	5.48 [0.70, 42.72]
	>100	101	1	1.0 [0.1, 6.2]		
Wrapped products during transport	Yes	8	0	0.0* [0.0, 32.5]	1.000**	-
	No	324	13	4.0 [2.2, 6.9]		
Meat origin	Hanoi suburban area	224	10	4.5 [2.3, 8.3]	0.559**	1.64 [0.44, 6.07]
	Neighboring provinces	108	3	2.8 [0.7, 8.5]		
Types of meat sold at the same shop	Pork only	240	10	4.2 [2.2, 7.8]	1.000**	1.29 [0.35, 4.80]
	Pork and others	92	3	3.3 [0.9, 9.9]		

*95 % CI adapted from Bunke (1959); **p-value for the Fisher's exact test

Appendix 6m. The proportion of norfloxacin resistant *E. coli* isolates and the analysis of potential risk factors (n=332)

Factors		No. of isolates (n)	No. of resistant isolates	% resistant isolates (95 % CI)	Chi-square test p-value (α=0.05)	Odds ratio (95 % CI)
Pork sold daily (kg)	Up to 100	231	10	4.3 [2.2, 8.1]	1.000**	1.10 [0.34, 3.58]
	>100	101	4	4.0 [1.3, 10.4]		
Wrapped products during transport	Yes	8	0	0.0* [0.0, 32.5]	1.000**	-
	No	324	14	4.3 [2.5, 7.3]		
Meat origin	Hanoi suburban area	224	9	4.0 [2.0, 7.7]	0.777	0.86 [0.28, 2.64]
	Neighboring provinces	108	5	4.6 [1.7, 11.0]		
Types of meat sold at the same shop	Pork only	240	8	3.3 [1.6, 6.7]	0.224	0.49 [0.17, 1.47]
	Pork and others	92	6	6.5 [2.7, 14.2]		

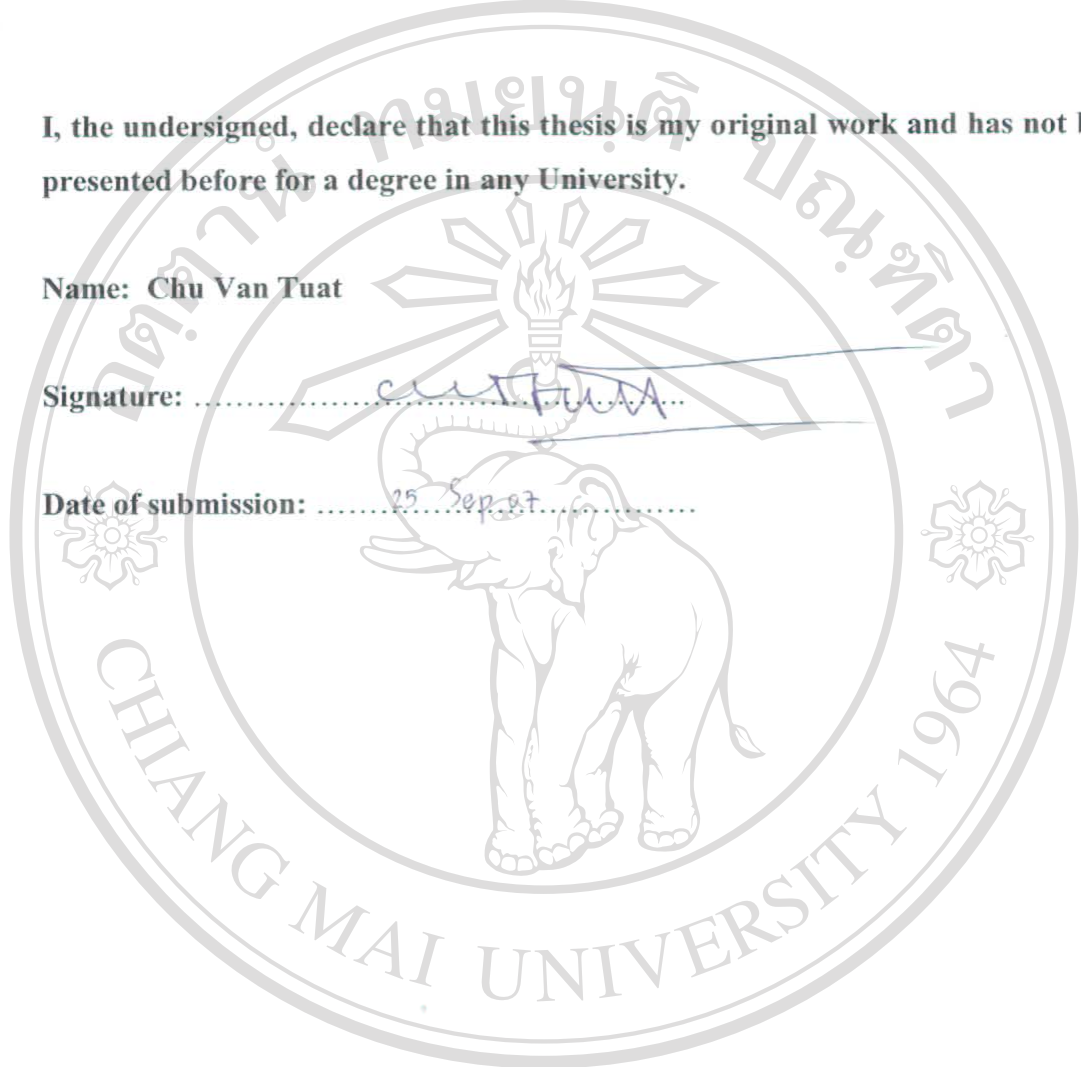*95 % CI adapted from Bunke (1959); **p-value for the Fisher's exact test

DECLARATION

I, the undersigned, declare that this thesis is my original work and has not been presented before for a degree in any University.

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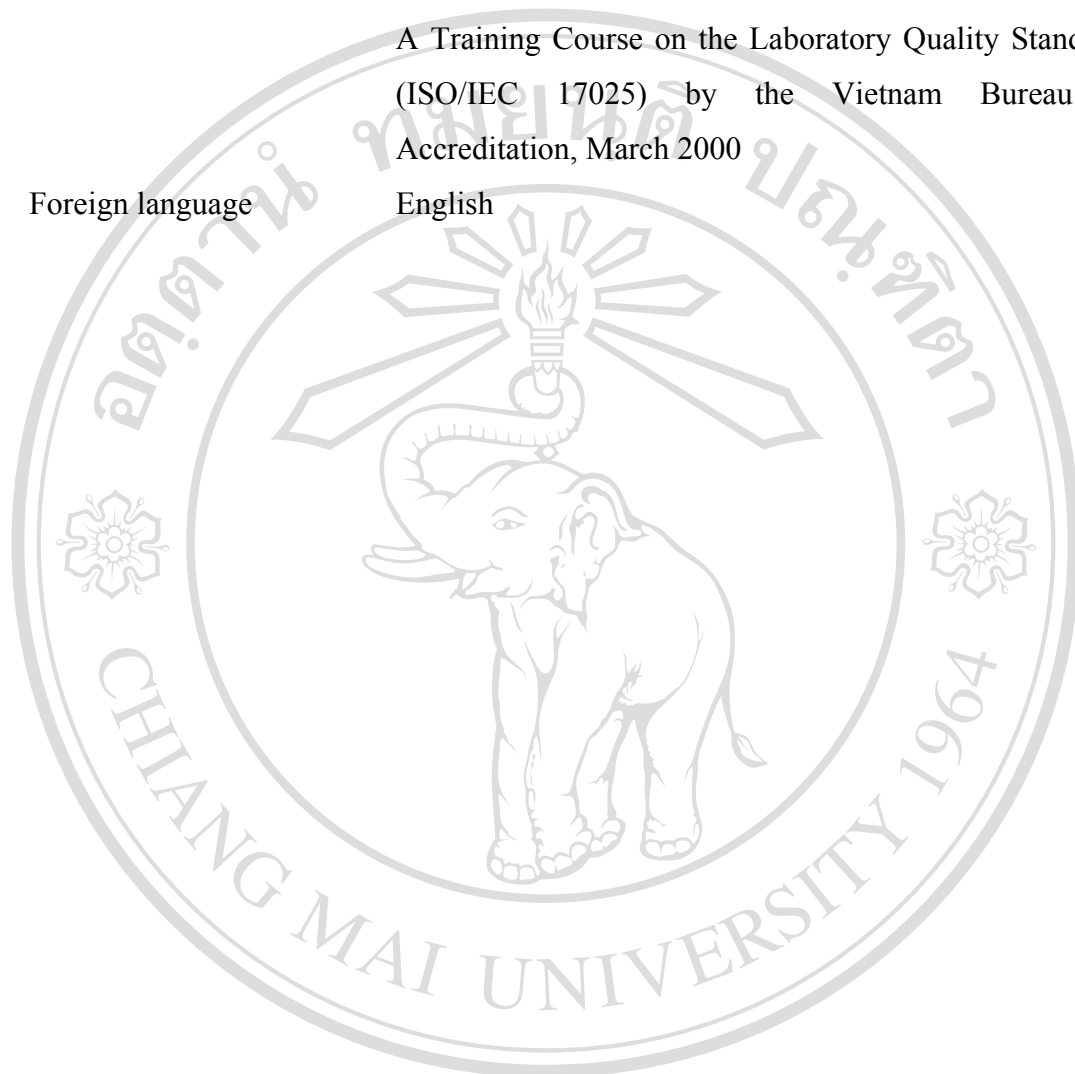
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