

CHAPTER IV

RESULTS

4.1 Slaughter conditions, facilities and operations in slaughterhouses

Slaughter conditions, facilities and operations in 5 selected slaughterhouses, which are 2 pig slaughterhouses and 3 chicken slaughterhouses, were observed. There are differences in slaughter process and practice and the summarized slaughterhouse data are shown in the Tables 6 to 9.

Table 6 General description of the slaughterhouses (SH) studied, Livestock Region 1, Thailand, 2013

SH name code	Species slaughtered	SH size category	No. of animals slaughtered /day	No. of workers	Operation time	Stunning applied	Butcher shop owned or related with butcher shop
SH P1	Pig	large	130	10	Night	no	owner
SH P2	Pig	large	150	20	Day	yes	owner
SH C1	Chicken	small	500	4	Night	no	owner
SH C2	Chicken	small	500	4-7	Night	no	relative
SH C3	Chicken	large	6,000	27	Day	yes	no

All selected slaughterhouses sell meat directly by themselves or by their relatives in their local area but the one large chicken slaughterhouse supplied meat to traders from the central part of Thailand (Table 6).

Table 7 Availability and functionality of the facilities in the slaughterhouses studied, Livestock Region 1, Thailand, 2013

B) Facilities	SH	SH	SH	SH	SH
	P1	P2	C1	C2	C3
Lairage area					
Stunner					
Shackle line and overhead conveyor					
Chiller					
Freezer					
Cold storage					
Worker facility (hand washing basin, boot water bath)					
Waste water treatment					
Knife sanitation facility					

Facility available, functioning and in use

Facility available but not in use

Facility available but not functioning

Facility not available

All slaughterhouses involved in this study have lairage area and waste water treatment. None of the slaughterhouses have a knife sanitation facility.

Table 8 The process of operation in the two studied pig slaughterhouses SH P1 and SH P2, Livestock Region 1, Thailand, 2013

Step in processing	SH P1	SH P2
Live animal handling	head restraint	small pen
Stunning method	no	electrical
Slaughtering method	Sticking by knife	sticking by knife
Dead animal handling	on floor	shackle line
Bleeding method	on the floor	shackle line
Scalding	scalding tank/pot	machine
Dehairing	manual	automatic machine
Abdomen opening	manual	manual
Evisceration method	manual by 1 worker	manual by 2 workers
Carcass splitting	cleaver	splitting saw
Cleaning/washing carcass	water hose	water hose
Chilling process	no	chilling and freezing room
Cutting	no	cutting process
Packing	no	plastic bag/ basket
Storage	no	chilling and freezing room

The two pig slaughterhouses are different in their operation practice: one pig slaughterhouse (SH P1) uses the modern automatic line and cold chain process and the other one (SH P2) uses the manual slaughter process and no cold chain processing. The SH P1 use the electrical stunning before slaughter, hang the dead animal on the shackle and eviscerate intestine, reproductive and urinary tract by one worker and eviscerate plucks, pancreas, spleen and stomach by another worker. The SH P2 doesn't stun the pig before slaughter even they have an electrical stunner. They slaughter on the floor and do dehairing by knife scraping. The evisceration process and spitting carcass is done by same one worker (Table 7 and 8).

Table 9 The process of operation in the three studied chicken slaughterhouses, SH C1, SH C2, and SH C3, Livestock Region 1, Thailand, 2013

Step in processing	SH C1	SH C2	SH C3
Live animal handling	restrained by one hand	restrained by one hand	hung on the shackle
Stunning method	no	no	electrical
Slaughtering method	neck vessels cut by Muslim	cut neck vessels	neck vessels cut by Muslim
Dead animal handling	put in a big bucket	put in a big bucket	shackle line
Bleeding method	in big bucket	in big bucket	shackle line
Scalding	scalding tank/pot	scalding tank/pot	machine
De-feathering	machine (drum plucker)	machine (drum plucker)	machine (drum plucker)
Abdomen opening	no	on the table	no
Evisceration method	no	manual	no
Cleaning/washing carcass	water tank	water tank	water tank
Chilling process	water tank with ice	water tank with ice	spin chiller/water tank with ice
Cutting	no	after finished slaughter	after finished slaughter
Packing	plastic bag	plastic bag	plastic bag/basket
Storage	no	freezer room	no

The two small- size chicken slaughterhouses are not stunning chicken before slaughter but one of them is performing halal slaughtering. Only one small chicken slaughterhouse does the evisceration all chicken before sale and this slaughterhouse have cold storage container for keeping frozen chicken. One large slaughterhouse is an old slaughterhouse with a shackle line, simple locally made water bath stunning, the automatic scalding tank with spin and long spin chiller (Table 7 and 9).

A checklist was set up based on the new Ministerial Regulation B.E.2555 (2012) to describe slaughterhouse facilities, operation and processing. The outcome scores are summarized and presented in Table 9

Table 10 Summarized results from the slaughterhouse checklist based on new Ministerial regulation B.E.2555 (2012), Livestock Region 1, Thailand, 2013

Criteria	Score	SH P1	SH P2	SH C1	SH C2	SH C3
Criteria, Procedures and Conditions for establishing slaughterhouse and lairage area						
Point 6 Suitable Location	5	5/5	5/5	5/5	5/5	5/5
Point 7 Surrounding of the building	7	4/7	7/7	5/7	7/7	6/7
Point 8 Construction of the building	4	1/4	4/4	2/4	3/4	4/4
Point 9 Interior of the building	8	5/8	8/8	6/8	7/8	7/8
Point 10 Tools, machinery and equipment	4	3/4	4/4	4/4	4/4	4/4
Point 11 Lairage area	Pig = 13 Chicken=12	10/13	12/13	10/12	12/12	12/12

Table 10 continue

Criteria	Score	SH P1	SH P2	SH C1	SH C2	SH C3
Criteria, Procedures and Conditions for Animal Slaughter						
Point 14 Slaughter animal criteria	5	3/5	5/5	4/5	4/5	5/5
Point 15 Disease Prevention procedures	3	3/3	3/3	3/3	3/3	3/3
Point 16 Hygienic control						
a. Personal hygiene	6	0/6	6/6	1/6	5/6	1/6
b. Process hygiene	9	5/9	9/9	7/9	8/9	7/9
Point 17 Manual and work instruction available	1	0/1	0/1	0/1	0/1	0/1
Point 18 Recall and traceability and record keeping	1	0/1	0/1	0/1	0/1	0/1
Point 19 Facilities for officers for auditing	1	1/1	1/1	1/1	1/1	1/1
Total score	For pigs=67	40/67	64/67	48/66	59/66	55/66
	For chicken=66					
In %		59.7%	95.5%	72.7%	89.4%	83.3%

The result from check list (Table 10) based on the new regulation Ministerial Regulation B.E. 2555 (2012), show the highest scores for the largest pig slaughterhouse. The overall average scores show that five slaughterhouses complied with 80% of requirements based on the new regulation Ministerial Regulation. The average in criteria, procedures and conditions for establishing slaughterhouse and

lairage area part average is 87% and criteria, procedures and conditions for animal slaughter part average is 70%. All five slaughterhouses are located in a suitable area and comply with the law which is 90% of average scores. It has to be noted that no drinking facilities were provided for chicken in the lairage area. However, the personal hygiene practice part reached the lowest total scores.

4.2 Facilities for meat inspection and post-mortem inspection findings

Table 11 General set-up and facilities for meat inspection in five slaughterhouses in Livestock Region 1, Thailand, 2013

General set-up, facilities and equipment near the inspection point	Slaughterhouses meeting criteria
· appropriate working height	n=3
· speed of slaughter allowing proper inspection	
· working space satisfactory	n=2
· water tap/hose for washing hands available	
· slaughter line not obstructed	
· lighting sufficient	n=0
· reserve knife or knife sterilizer available	
· condemnation containers are lockable	
· <u>pig</u> inspection: - carcass paired with viscera and head for inspection	
· <u>chicken</u> inspection: - whole carcass inspection possible	

From Table 11 it becomes apparent that for almost any criteria applied slaughterhouse compliance is deficient.

Table 12 A summary of pig post-mortem results from 5 recorded (N=1,352) from the study slaughterhouses in Livestock Region 1, Thailand, 2013

Post-mortem (PM) findings	Cases found	in %
<u>PM findings in internal organs</u>		
Lung lesions and pleuritis	810	59.9%
Liver lesions	189	14%
Spleen lesions	113	8.4%
Heart lesion	101	7.5%
<u>PM findings in carcass</u>		
Skin lesions	198	14.6%
Lymph nodes abnormal	99	7.3%
Wounds and abscesses	28	2.1%
Trauma	22	1.6%
Fractures	4	0.3%

More than half of the pigs inspected presented inflammatory lesion in the respiratory tract but only every seventh pig liver was affected (Table 12).

Table 13 A summary of chicken post-mortem results from 5 recorded (N=30,195) from the study slaughterhouses in Livestock Region 1, Thailand, 2013

Post-mortem (PM) findings	Cases found	in %
- Leg and body bruises/fractures	449	1.49%
- Wing bruises/fractures	648	2.15%
- Arthritis/joint lesions	407	1.3%
- Skin disease/lesions	363	1.2%
- Over-scalded	330	1.1%
- Emaciated/undersized	172	0.6%
- DOA (dead on arrival)	81	0.3%
- Hock burns	61	0.2%
- Breast blisters	33	0.1%
- Abnormal colour/septicaemia	23	0.08%
- Incomplete bleeding	9	0.03%
- Ascites	10	0.03%

In general PM findings in poultry were at a low level with bruises and fractures being most prevalent (Table 13).

4.3 The results of bacterial contamination testing in meat

Laboratory results of meat samples for bacterial contamination of 5 selected slaughterhouses in 2012 (Table 13) include a total number of meat sample of 73 of which more than half of the meat samples were found to exceed the standard.

Table 24 Laboratory results for contamination of meat samples from 5 selected slaughterhouses, Livestock Region 1, Thailand, 2012

SH code	Number of meat sample	Number samples exceeding the Guidelines standard	Number of APC excess limit	Number of <i>Salmonella</i> spp. positive
DLD std.			$\leq 5.0 \times 10^5$ cfu/g	Not found in 25 g
SH P1	4	3	3	1
SH P2	11	2	1	2
SH C1	18	12	1	11
SH C2	19	16	6	12
SH C3	21	11	3	9
Total	73	44 (60%)	14 (19%)	35 (48%)

The laboratory result of 5 selected slaughterhouses in 2012 found that 60% of the meat samples exceeded the Guideline standards, 48% were *Salmonella* spp. positive and 19% of APC results were higher than the standard.

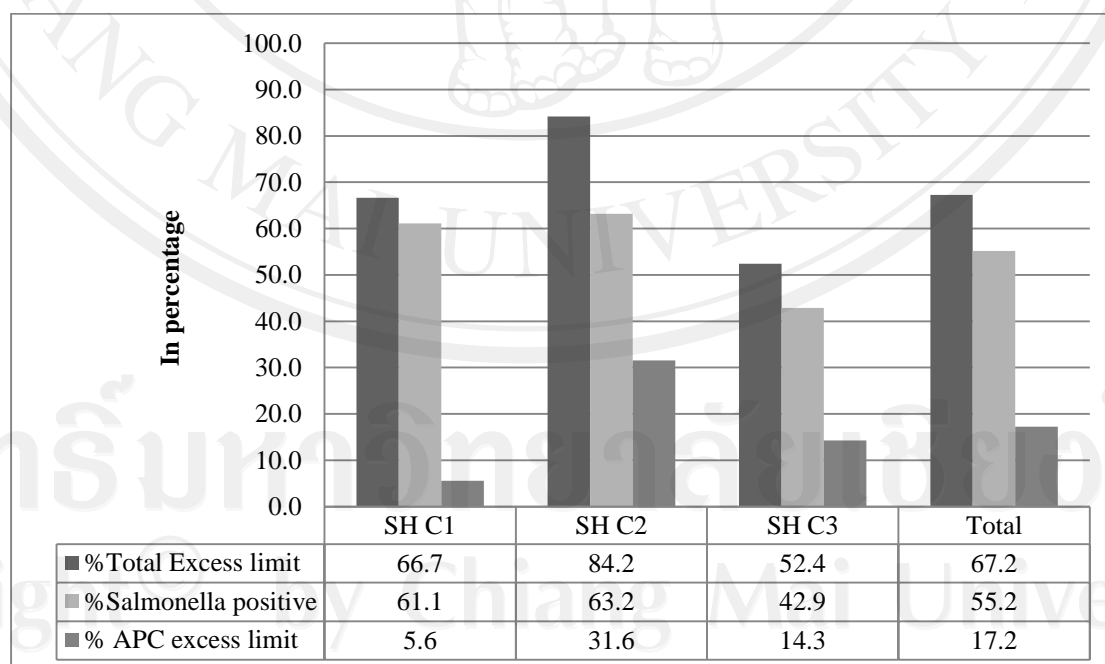


Figure 2 A comparison of bacterial contamination found in chicken meat samples from three poultry slaughterhouses, Livestock Region 1, Thailand, 2012

Around 67.2% of chicken meat sample is out of standard and major cause is found 55.2% *Salmonella* positive. The highest exceed bacterial contamination in three studied chicken slaughterhouses is 84.2% from slaughterhouse SH C2.

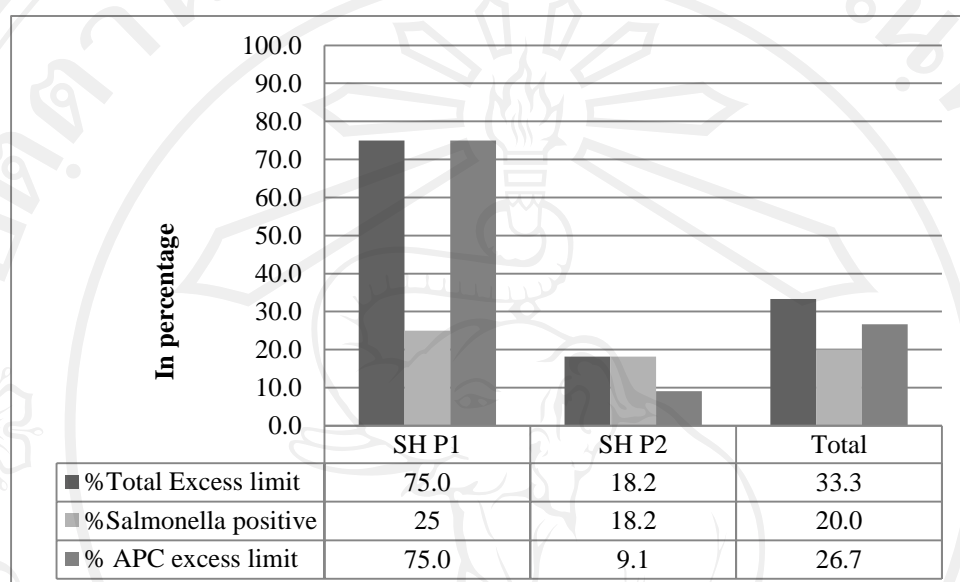


Figure 3 A comparison of bacterial contamination found in pork samples from 2 pig slaughterhouses, Livestock Region 1, Thailand, 2012

Based on the DLD guidelines, the total of pork samples that exceed the bacterial contamination limit is 33.3%. It was also found that 26.7% of APC exceed limit and 20% were *Salmonella* positive. Bacterial contamination in pork meat sample from two pig slaughterhouse is extremely different about 4 times.

Table 15 The result of *Salmonella* positive from meat samples of 5 selected slaughterhouses

Item	No. of <i>Salmonella</i> positive samples/total samples	In %
<i>Salmonella</i> spp.	35/73	47.9

Table 16 The result of *Salmonella* serogroup from *Salmonella* positive samples

Serogroup	Serogroup samples/total <i>Salmonella</i> positive samples	In %
<i>Salmonella</i> gr.C	25/35	71.4
<i>Salmonella</i> gr.B	12/35	34.3
<i>Salmonella</i> gr. other	3/35	8.6

Nearly half of meat samples from 5 studied slaughterhouses are found *Salmonella* positive. The dominant serogroup of *Salmonella* positive found in meat samples are *Salmonella* group C (71.4%).