

EVALUATION OF GOOD MANUFACTURING PRACTICE (GMP), STANDARD SANITATION OPERATING PROCEDURE (SSOP) FOR TRADITIONAL CHICKEN SLAUGHTERHOUSES IN MALANG CITY

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Abstract: Sanitation practices in the process of slaughtering chickens are very influential on the occurrence of contamination of microorganisms so traditional chicken slaughterhouses (RPA) must apply good production practice procedures or Good Manufacturing Practices (GMP) and sanitation procedures or Sanitation Standard Operating Procedures (SSOP) to produce chicken meat that meets microbiological requirements. This study aims to evaluate the implementation of GMP and SSOP and categorize it in Traditional RPA in Malang City. The evaluation was carried out at 75 RPA in 5 sub-districts in the city of Malang where the GMP and SSOP aspects referred to NKV 2005 and SNI 01-6160-1999 with the weighting of each aspect. The evaluation results show that traditional RPA in the city of Malang in terms of fulfilling GMP and SSOP aspects are categorized at level III to level V. In terms of fulfilling GMP aspects, they are categorized as level III (6.6%) and level IV (93.3%). The SSOP aspect fulfillment profile is categorized as level III (15%), level IV (50.6%), and level V (35%). The highest GMP aspects that are not fulfilled by traditional RPA are location and environmental aspects (91%) as well as raw material handling and processing aspects (88%). The highest SSOP aspects that were not fulfilled were the sanitation aspect (79%) and the personal hygiene aspect (71%). Based on the evaluation results of the critical parameter aspects (weighted 2) several recommendations are prepared in order to increase the fulfillment of GMP and SSOP in traditional RPA.

Keywords: Good Manufacturing Practices (GMP); Sanitation Standard Operating Procedure (SSOP); Chicken Slaughterhouse; chicken.

INTRODUCTION

The population and meat production of broiler chickens has increased significantly from year to year. Statistical data from the East Java livestock service reported this from 2015 to 2019, namely a population of 194,064,874 heads, an increase of 460,040,240 heads, while meat production, namely 203,139 tons per year, increased by 510,536 tons per year (Anonymous, 2019).

Chicken slaughterhouses are places where chicken carcass production processes play an important role in producing quality chicken carcasses to ensure consumer protection in obtaining safe, healthy, intact and halal (SHIH) meat. There are two types of chicken slaughterhouses (RPA) according to (Abubakar & Setianto, 1991), namely modern RPA and traditional RPA. Several differences exist in the two types of RPA, namely the cutting process, capacity and quality of chicken meat produced so that it will affect the level of consumer acceptance. Traditional RPA according to the Directorate of Veterinary Public Health (2018) is characterized by the cutting process using traditional tools and carcass handling carried out on a table or floor.

SHIH meat is a requirement that must be met by producers to produce quality-assured products so that RPA needs to pay attention to the safety of chicken meat as a result of its cuts because of its high nutritional content so that chicken meat is easily damaged and results in consumer health problems (meat contaminated with microbes, especially pathogens). (Hoelzer, Moreno Switt, & Wiedmann, 2011) reported

that animal slaughter is the main source of contamination by *Salmonella* sp. in meat, so that the practice of cutting must be considered in its working order to support food safety. The process of handling livestock and meat in RPA which is not good and does not pay attention to sanitation and hygiene factors, will have an impact on the quality, halal and safety of the meat produced. Pathogenic bacteria that are often found in broiler chickens according to (Utari et al., 2016), among others, namely *Salmonella* Enteritidis, *Staphylococcus aureus*, *Campylo bacterje juni*, and *Listeria monocyte* gene. In order to minimize both microbial, physical and chemical contamination, RPA needs to pay attention to the hygiene aspect which can be seen from the production flow and sanitation practices carried out (Murtidjo, 2003). Both modern and traditional RPA need to apply good production practice procedures or

Good Manufacturing Practices (GMP) to produce products according to the desired standards. The implementation of GMP is supported by the presence Sanitation procedures or Sanitation Standard Operating Procedure (SSOP) to ensure the safety of chicken meat produced. In addition to meeting GMP and SSOP, meeting halal requirements is also a current requirement (Badan Standarisasi Nasional, 2016). The research results of (Kuntoro, Maheswari, & Nuraini, 2012) in ruminant slaughterhouses showed that SSOP that was not applied to its maximum was closely related to the level of bacterial contamination in meat as seen from the analysis of TPC, *E. Coli*, and Coliform.

Several regulations and technical rules

for producing halal and thoyib chicken meat include the Poultry Slaughterhouse Standards (National Standards Agency, 1999); Chicken carcass quality (National Standards Agency, 2009); Guidelines for Halal Assurance System (HAS) for Slaughterhouses (LPPOM MUI, 2012). According to (Khoirudin, 2017), the average RPA in the city of Yogyakarta only reached 46.07%, which complies with SNI standards. Assessment components that are not in accordance with SNI include: requirements for slaughterhouse locations, RPA facilities, RPA main building space, RPA equipment, employee and company hygiene requirements, for meat transport vehicles, chicken slaughter, packaging, storage and delivery. According to (Suryanto & Sipahutar, 2020) the implementation and implementation of GMP in halal-certified RPA in the Special Region of Yogyakarta has not been fully carried out properly. There is a significant correlation between GMP implementation and meat quality (pH and TPC (Total Plate Count)). (Sibarani, 2011) reported that there were 4 chicken slaughterhouses in Bogor which showed improper handling practices and microbial contamination of the chicken meat produced exceeded standards. Salmonella spp contamination is related to cross-contamination from feces when slaughtering (Hoelzer et al., 2011), while Campylobacter jejuni in chicken carcasses can come from live chickens (Hermans et al., 2012).

Starting from the above, it is necessary to conduct research on the application of GMP and SSOP in traditional RPA so that the quality of meat circulating in the market meets the standards. The research results

are expected to be a reference for a better handling system.

MATERIALS AND METHODS

The research was conducted from April to July 2021 at a traditional chicken slaughterhouse business in the city of Malang. The tools used are in the form of a questionnaire (general data, specific and evaluation questions) and Microsoft Excel to process the data. The questionnaire questions refer to the modified Veterinary Control Number (VCN) and Indonesian National Standard 01-6160-1999 forms.

This research method is survey, observation, documentation, interviews, evaluation and observation. The research was conducted in four stages including 1). preparation and verification of questionnaires, 2). determination of RPA respondents, 3). observation in traditional chicken slaughterhouses in the study area, 4). Evaluation of GMP and SSOP compliance and data analysis. The questionnaire consisted of 38 negative questions (unqualified conditions), 29 questions related to GMP and 9 questions related to SSOP. Each question has a rating weight, namely a score of 1 if the level of non-compliance with the requirements with low contamination risk or not critical (16 GMP questions and 3 SSOP questions); a score of 2 if the level of non-compliance with the requirements with a high or critical risk of contamination (12 GMP questions and 6 SSOP questions) and a score of 0 if the conditions meet the requirements. The total weighted value added together (GMP aspect total=40, SSOP aspect TOTAL=15) is used to increase the highest level of

contamination in traditional RPA.

Data analysis is written mathematically through the equation below:

$$\% \text{ Ketidaksesuaian} = \frac{\Sigma \text{ nilai terbobot}}{\text{Total nilai terbobot}} \times 100\%$$

The percentage of non-compliance with the standards is used to assess the feasibility of facilities and sanitation (Table 1).

Table 1
RPA Unit Processing Facility Assessment Level

Grade	Percentage of non-conformity (%)	Deviation Category	Category Appropriateness
I	0–25	Not critical	Worthy
II	25–50	Very less critical	Sufficiently worthy
III	50–75	Less critical	Less worthy
IV	75–100	Sufficiently critical	Unworthy
V	100	Critical	Very unworthy

Sumber: VCN (Permentan 2005)

RESULTS AND DISCUSSION

The stages of the chicken meat production process in traditional RPA start from receiving live chickens, slaughtering, draining the blood, scalding (soaking in hot water), plucking (removing feathers), removing innards, washing carcass, handling offal and carcass, packaging and distribution, cleaning tools and buildings. There are several steps that are not carried out which make it different from modern

RPA, including stunning, antemortem and postmortem examination.

The results of evaluating the feasibility of business units which are the terms and conditions for establishing RPA (based on the NKV form and Indonesian National Standard 01-6160-1999) from the GMP and SSOP deviation aspects of 75 traditional RPA in Malang city are presented in Table 2 and Table 3.

Table 2
Percentage of non-compliance with GMP aspects and traditional RPA categories

	A	B	C	D	Total	Total Score	
						Percentage 100%	Category
Γ1	1	7	1	14	23	58	III
Γ2	2	6	1	14	23	58	III
Γ3	2	7	1	14	24	60	III
Γ4	1	9	2	14	26	65	IV

15	2	10	2	14	28	70	IV
16	2	11	2	14	29	73	IV
17	2	11	2	14	29	73	IV
18	2	8	1	14	25	63	IV
19	1	10	1	14	26	65	IV
20	1	10	1	16	28	70	IV
21	2	10	1	16	29	73	IV
22	2	7	1	16	26	65	IV
23	2	10	1	16	29	73	IV
24	2	10	1	16	29	73	IV
25	2	10	1	16	29	73	IV
26	2	9	1	16	28	70	IV
27	2	9	2	16	29	73	IV
28	2	10	2	16	30	75	IV
29	2	10	2	16	30	75	IV
30	2	10	1	16	29	73	IV
31	1	7	1	14	23	58	III
32	2	6	1	14	23	58	III
33	2	7	1	16	26	65	IV
34	1	9	2	16	28	70	IV
35	2	10	2	16	30	75	IV
36	2	11	2	16	31	78	IV

27	2	11	2	16	31	78	IV
28	2	8	1	16	27	68	IV
29	1	10	1	16	28	70	IV
30	1	9	1	16	27	68	IV
31	1	8	1	16	26	65	IV
32	2	8	2	16	28	70	IV
33	2	10	2	16	30	75	IV
34	1	11	2	14	28	70	IV
35	2	11	2	14	29	73	IV
36	2	11	1	16	30	75	IV
37	2	9	1	16	28	70	IV
38	2	9	1	16	28	70	IV
39	1	9	1	16	27	68	IV
40	1	8	1	16	26	65	IV
41	2	6	1	16	25	63	IV
42	2	7	1	16	26	65	IV

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43	2	8	1	16	27	68	IV
44	2	9	1	16	28	70	IV
45	2	9	2	16	29	73	IV
46	2	9	2	16	29	73	IV
47	2	9	1	16	28	70	IV
48	2	9	2	16	29	73	IV
49	2	8	1	16	27	68	IV
50	2	10	1	16	29	73	IV
51	2	11	1	16	30	75	IV
52	2	8	1	16	27	68	IV
53	2	6	1	16	25	63	IV
54	2	10	2	18	32	80	IV
55	2	9	1	16	28	70	IV
56	2	9	1	16	28	70	IV
57	2	10	2	16	30	75	IV
58	2	10	2	16	30	75	IV
59	2	10	1	16	29	73	IV
60	2	10	1	16	29	73	IV
61	2	11	1	16	30	75	IV
62	2	11	1	16	30	75	IV
63	1	9	1	16	27	68	IV
64	2	9	1	18	30	75	IV
65	2	8	1	18	29	73	IV
66	1	9	1	18	29	73	IV
67	2	9	2	16	29	73	IV
68	2	8	2	18	30	75	IV
69	2	8	2	18	30	75	IV
70	2	10	2	18	32	80	IV
71	2	8	2	16	28	70	IV
72	2	9	2	16	29	73	IV
73	2	9	1	16	28	70	IV
74	2	10	1	16	29	73	IV
75	2	9	1	16	28	70	IV

Note: A=Location and environment,B=Main building,C=Facilities,D=raw materials handling and processing

Table 2 shows that the percentage value of GMP non-conformance ranges from 58% to 80%. The overall average non-compliance of traditional RPA is 70.20%, which is classified as less critical or less

feasible in terms of the basic feasibility of the RPA unit. In grouping categories as much as 6.6% is level III (less critical) and 93.3% is classified as level IV (quite critical). The highest non-compliance with GMP aspects, namely 80%, was shown in RPA T54

and T70.

The GMP component which consists of several aspects, in this case 4 aspects, needs to be traced to which aspect shows

the dominant non-compliance. Figure 1 shows the GMP aspect incompatibility values in different aspects.

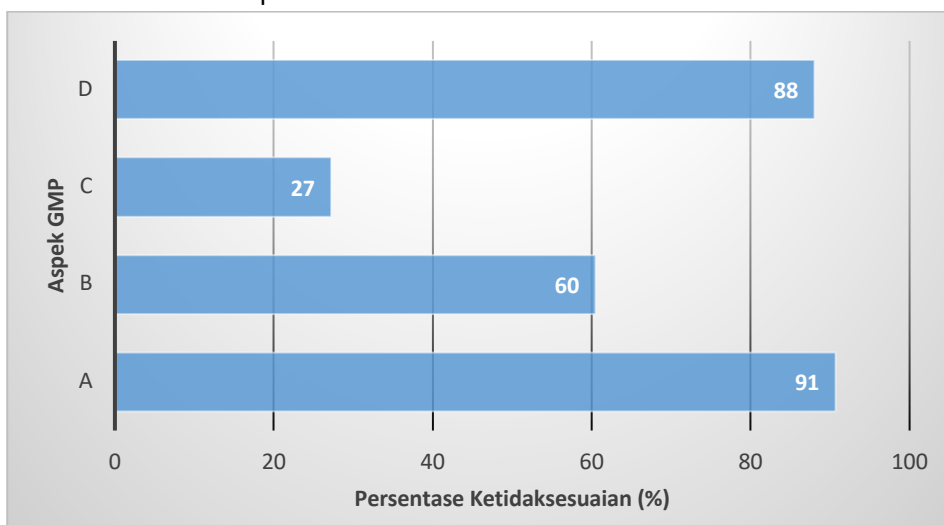


Figure 1

Percentage of non-compliance with GMP aspects in traditional abattoirs

The results showed that aspect A (location and environment) showed the greatest discrepancy, namely 91%, followed by aspect D (raw material handling and processing) of 88%. This happens because the location and environment of traditional RPA are not supposed to be in settlements, so this makes RPA unfeasible to establish in terms of location requirements. While in the aspects of raw materials, handling and processing there are several aspects that are not fulfilled so that this greatly affects

the quality of chicken carcass. The absence of antemortem and postmortem inspections, when the carcass is mixed with offal, the carcass is in contact with the floor and the carcass is not cooled causes the carcass quality to be low because there will be many chances of cross contamination. In addition, carcasses are not packaged because they are placed in open tanks. Of course, this must get attention from the relevant agencies to improve the feasibility of traditional RPA.

Table 3

Percentage of Non-conformance of SSOP Aspects and Traditional RPA Categories

RPA	E	F	Total	Total Score Percentage 100%	Category
T1	7	4	11	73	IV
T2	7	4	11	73	IV
T3	7	4	11	73	IV
T4	7	4	11	73	IV
T5	7	6	13	87	V
T6	7	4	11	73	IV

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T7	7	4	11	73	IV
T8	7	4	11	73	IV
T9	7	6	13	87	V
T10	7	4	11	73	IV
T11	7	6	13	87	V
T12	7	6	13	87	V
T13	7	4	11	73	IV
T14	7	4	11	73	IV
T15	7	4	11	73	IV
T16	7	4	11	73	IV
T17	7	6	13	87	V
T18	7	6	13	87	V
T19	7	6	13	87	V
T20	7	6	13	87	V
T21	3	4	7	47	III
T22	3	4	7	47	III
T23	3	4	7	47	III
T24	3	4	7	47	III
T25	7	6	13	87	V
T26	7	4	11	73	IV
T27	7	4	11	73	IV
T28	7	4	11	73	IV
T29	7	6	13	87	V
T30	7	4	11	73	IV
T31	7	6	13	87	V
T32	7	6	13	87	V
T33	7	4	11	73	IV
T34	7	4	11	73	IV
T35	7	4	11	73	IV
T36	7	4	11	73	IV
T37	7	6	13	87	V
T38	7	6	13	87	V
T39	7	6	13	87	V
T40	7	6	13	87	V
T41	7	4	11	73	IV
T42	7	4	11	73	IV
T43	7	4	11	73	IV
T44	7	4	11	73	IV
T45	3	6	9	60	III
T46	3	4	7	47	III

T47	3	4	7	47	III
T48	7	4	11	73	IV
T49	3	4	7	47	III
T50	7	6	13	87	V
T51	7	4	11	73	IV
T52	7	6	13	87	V
T53	7	6	13	87	V
T54	7	6	13	87	V
T55	7	4	11	73	IV
T56	7	4	11	73	IV
T57	7	4	11	73	IV
T58	7	4	11	73	IV
T59	7	6	13	87	V
T60	7	6	13	87	V
T61	7	6	13	87	V
T62	7	6	13	87	V
T63	7	4	11	73	IV
T64	7	4	11	73	IV
T65	7	4	11	73	IV
T66	7	4	11	73	IV
T67	7	6	13	87	V
T68	7	4	11	73	IV
T69	7	4	11	73	IV
T70	7	4	11	73	IV
T71	7	4	11	73	IV
T72	7	6	13	87	V
T73	3	4	7	47	III
T74	3	4	7	47	III
T75	3	4	7	47	III

Note: E=Personal hygiene, F=Sanitation

Fulfillment of SSOP aspects is presented in Table 3. The percentage value of SSOP non-conformance ranges from 47% to 87% and is classified in categories III, IV and V. The average SSOP non-conformity as a whole for traditional RPA is 74.2% which is classified as quite critical or not worthy of review from the basic feasibility of RPA units, especially aspects of

hygiene and sanitation. In grouping categories as much as 15% belong to level III (less critical), 50.6% level IV (quite critical) and 35% level V (critical). The highest SSOP discrepancy of 87% was shown in 7 RPA namely T5, T9 T11, T19 T12, T17, T18, T18, T20 and T19.

Two aspects of SSOP need to be traced to which aspect is the dominant non-conformity in traditional RPA. Figure 2

shows the value of the SSOP aspect incompatibility in different aspects.

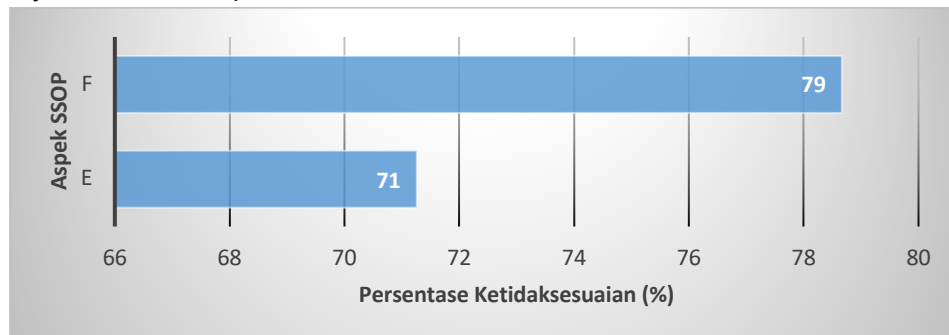


Figure 2

Percentage of SSOP non-compliance in traditional abattoirs

The results of the study showed that aspect F (sanitation) showed the greatest inappropriateness, namely 79%, followed by aspect E (personal hygiene) of 71%. The requirements for this aspect are very critical to note because they involve irregularities that directly affect carcass quality, especially in terms of the spread of disease.

One of the food safety principles proclaimed by WHO is to wash hands as often as possible, Aspects of personal hygiene with the habit of washing hands only after the cutting process and the unavailability of washing facilities were found during observations. The habit of washing hands is important to reduce the possibility of contamination from workers into chicken meat products. The habits and level of knowledge of workers on hygiene and sanitation will have an impact on preventing contamination incidents. According to (Alhaji & Baiwa, 2015), there is a significant correlation between the level of knowledge and habits of workers. Research shows that workers' poor

knowledge of sanitation is correlated with not carrying out procedures properly. The unavailability of special clothing for workers causes cross-contamination. According to (Kadariya et al., 2014), there is a very significant positive correlation between poor sanitation and contamination by *Salmonella sp.* and *S aureus* on chicken carcasses

Improvement of Fulfillment Aspects as Recommendations

In order to improve the safety of chicken meat produced by traditional RPA in the city of Malang, the fulfillment of GMP and SSOP is very necessary. GMP and SSOP aspects studies that have critical value (weight 2) in traditional RPA that are not fulfilled by more than 90% of traditional RPA (Table 4) are the basis for preparing recommendations to fulfill these aspects. Recommendations for meeting GMP and SSOP aspects are presented in Table 4.

Table 4

Parameters on GMP and SSOP Aspects that are Not Fulfilled by RPA			
Aspect	Inquiry Number	Parameters on GMP and SSOP Aspects with a Value of 2	Number of RPA that did not meet (%), n=75
Aspek GMP			
B	13	There are no facilities for hand washing with soap	150 (100)
D	22	No ante mortem examination was carried out on the birds to be slaughtered	150 (100)
	23	Healthy birds and sick birds are not separated	122 (81)
	25	The carcass is not separated from the offal	150 (100)
	26	Chicken carcass in contact with floors and/or dirty materials	150 (100)
	27	Postmortem examination was not carried out on every slaughtered bird	150 (100)
	28	No cooling of the carcass	150 (100)
	29	Transport of unhygienic carcasses (eg packaged)	150 (100)
SSOP Aspect			
E	31	Employees do not wash their hands with soap before and after work	128 (85)
	32	Employees not preventing cross-contamination (e.g. smoking and spitting)	128 (85)
	34	Workers do not pay attention to hygiene and sanitation	150 (100)
F	38	Equipment and containers are not disinfected after use.	150 (100)

Table 5
Recommendations for improvement for Traditional RPA

Aspect	Recommendations for fulfillment of aspects
GMP Aspect	
B	Separate or create a partition for dirty and clean areas Equip business facilities with a place to wash hands with soap Conduct ante mortem inspection on poultry to be slaughtered by calling service officers periodically
D	Separation of healthy birds and sick birds The carcass is separated from the offal Chicken carcass should not come into contact with floors and/or dirty materials

Conducting postmortem inspection on every slaughtered poultry periodically through the relevant agencies
 Cooling the carcass
 Transportation of carcasses in a hygienic manner and packaging

SSOP Aspect	
E	Make it a habit for employees to wash their hands with soap before and after work Employees do not smoke during the production process Workers pay attention to hygiene and sanitation
F	Equipment and containers are periodically disinfected.

CONCLUSIONS

Traditional RPA in the city of Malang in terms of fulfilling GMP and SSOP aspects are categorized at level III to level V. In terms of fulfilling GMP aspects, they are categorized as level III (6.6%) and level IV (93.3%). The SSOP aspect fulfillment profile is categorized as level III (15%), level IV (50.6%) and level V (35%). Based on the evaluation of each aspect, the highest GMP aspects that were not met by traditional RPA were location and environmental aspects (91%) and raw material handling and processing aspects (88%). The highest SSOP profile was not fulfilled namely the sanitation aspect (79%) and the personal hygiene aspect (71%).

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