

Biosecurity Application of Small Scale Chicken Abattoir in Sidoarjo, East Java, Indonesia

Faisal Fikri¹, Muhammad Thohawi Elziyad Purnama^{2*}

¹Department of Physiology and Pharmacology, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, 60115, Indonesia;

²Department of Veterinary Anatomy, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, 60115, Indonesia;

*Corresponding author; e-mail id: thohawi@fkh.unair.ac.id

Article History:

Submitted: 27.02.2020

Revised: 07.04.2020

Accepted: 01.06.2020

ABSTRACT

Aim: This study aimed to produce compatible biosecurity audit instrument and also to find out the expedience level of biosecurity application of small scale chicken abattoir in Sidoarjo, East Java, Indonesia.

Materials and Methods: Method used was survey in small scale chicken abattoir with quantity of respondents as many as 10 respondents existing in Sidoarjo. Data collection in this research used procedure of questionnaire technique, documentation technique and interview technique. Analysis used involved reliability test and multi dimension scaling.

Results: Measurement instrument of biosecurity application can be applied with result of small scale chicken abattoir in Sidoarjo with score of 2.362 obtaining sufficient predicate. Application of biosecurity aspect in small scale chicken abattoir involved aspect of raw material,

handling and processing, aspect of main building construction, aspect of facility, aspect of personal hygiene and aspect of sanitation.

Conclusion: It can be concluded from the study that the measurement instrument of biosecurity application was compatible to be applied for small scale chicken abattoir in several aspects, involves fresh product storage, cooling implementation and processing room separation.

Keywords: audit instrument, biosecurity, chicken abattoir, Sidoarjo

Correspondence:

Muhammad Thohawi Elziyad Purnama

Department of Veterinary Anatomy, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, 60115, Indonesia

E-mail: thohawi@fkh.unair.ac.id

DOI: [10.31838/srp.2020.6.35](https://doi.org/10.31838/srp.2020.6.35)

@Advanced Scientific Research. All rights reserved

INTRODUCTION

Poultry nutrition is a source of animal protein to ensure food availability. Several risk factors have the potential to cause food borne diseases and zoonoses, including the preparation, slaughtering, processing and packaging of products.¹ The establishment of slaughterhouse building has the purpose to provide a sense of safety and sanitation of carcass products. The fulfillment of high quality slaughterhouses such as Hazard Analysis Critical Control Point system (HACCP) is one of the efforts to prevent contamination of carcasses.²

Small scale chicken abattoir in animal husbandry functions in live chicken and processes into carcass which is ready to consume for supplying animal protein needs of society.³ Escalation of chicken carcass production in order to meat self-sufficiency has to be followed by escalation of quality and food safety and halal guarantee.⁴ Chicken carcass is animal food product which is sensitive to microbiology, risky to be disease and poisoning as it is easily contaminated by pathogenic microorganisms and easy to decay since its constituent components which are very favourable for microorganism growth.^{5,6}

In processing process cross contamination happening during cutting process and evisceration often happens too, microorganisms can be immigrated from carcass to the other carcass through workers' hand, knife, and viscera ejection tools.⁷ Biosecurity is necessary to be conducted to guarantee food products from the animals safe, healthy, integrate and halal in order to actualize health and inner peace of society, accordingly each unit of chicken needs a written proof proving that its products have met the basic eligibility of the animal food safety, as result of biosecurity application of chicken abattoir.⁸⁻¹⁰ Currently, health guarantee for chicken abattoir can not be equated yet by using checklist of Veterinary Control Number which has existed hence more specific and accurate appraisal system is

required to assess biosecurity application of small scale chicken abattoir in Sidoarjo.

The aim of this study was to analyse the problems of biosecurity application measurement which is compatible for small scale chicken abattoir in Sidoarjo. This study had identified the affecting aspects from biosecurity application of small scale chicken abattoir, involves aspect of location and environment, main building construction, facility, raw material, handling and processing, personal hygiene and sanitation.

MATERIALS AND METHODS

ETHICAL APPROVAL

Ethical approval was not applicable for this study. However, the data was collected as per standart audit instrument with highly validity.

MATERIALS

This research used small scale chicken abattoir with quantity of respondents as many as 10 respondents existing in Sidoarjo, East Java Province, Indonesia.

METHODS

Model of Sampling

Model of sampling was conducted intentionally (Purposive Sampling), this sampling was conducted based on several criteria namely small scale chicken abattoir located in the area of Animal Husbandry Department of Sidoarjo District. Small scale abattoir had a daily cutting quantity as many as 1000 individuals.

Methods of data collection and measurement instruments Procedure of data collection was conducted through direct observation and interview. Data collection in this research used these methods: questionnaire technique, documentation technique and interview technique. Materials of the research was primary data and secondary

data regarding biosecurity application system of small scale chicken abattoir aspects which were found in application of chicken abattoir involving aspect of location and environment, main building construction, raw material, handling and processing, facility, personal hygiene and sanitation. Biosecurity is proceeding to protect animal or human populations from biological agent threat. Application of biosecurity is very noteworthy to optimize poultry production, increase animal welfare and maintain animal product safety.¹¹ Hygiene is all effort relating to health problem and all effort to retain or remedy health.

Analysis of multidimensional scaling

Definition of small scale chicken abattoir involving chicken abattoir located in Animal Husbandry Departement of Sidoarjo District. Analysis of Multidimensional Scaling (MDS) was one of double variables which could be used to determine position of the other object based on assessment of similarity. MDS is also called as Perceptual Map. MDS relates to map construction to describe position of an object with the other objects based on the similarity of the objects. MDS is also technique which is able to assist researcher to recognize or identify key dimension which underlies object evaluation from respondents. Method of MDS recitation in this case was based on quadrants which could be seen in the figure of MDS result. Quadrant I positive – positive area meant the very nifty result (support). Quadrant II positive area and quadrant IV negative positive area meant the nifty result (constantly noticed). Quadrant III negative – negative meant the bad result (must be regenerated), in this quadrant it could be told that it would be worse if abscissa value (x axis) and ordinate (y axis) kept off zero value together.

Statistical analysis

Reliability is instrument to measure the questionnaire which is indicator from variable. Questionnaire is stated that it will be reliable if answer of somebody to the question is consistent or stable from period to period. This research used SPSS as facility to measure reliability test by statistic test. Variable was stated that it would be reliable if it presented value of Cronbach Alpha (α) > 0.070 if it has not reached the standard yet the possibility was one or some items were not reliable: Identify each item by reliability analysis procedure immediately.¹²

RESULTS

Table.1 shows that small scale chicken abattoir in Sidoarjo based on scoring result of biosecurity application instrument obtained result 2.362 with sufficient predicate. Scoring result was continued by analysis of Multi Dimension Scaling.

Figure.1 showed the analysis of Multi Dimension Scaling of small scale chicken abattoir, it could be read that the aspects were very supportive existing in quadrant I involving aspect of raw material, handling and processing involving fresh product storage and cooling implementation. The next supportive aspect was aspect of main building construction involving sector of processing room separation with the other rooms in small scale chicken abattoir. Supportive aspect from biosecurity management system of small scale

chicken abattoir however it still had to be reviewed more was in quadrant II and IV. In quadrant II namely from aspect of main building construction, aspect of raw material, handling and processing were necessary to be reviewed more from sector of process management system.

DISCUSSION

Aspect of facility which was necessary to be reviewed from condition sector of changing room. Aspect of location and environment involving distance sector of chicken abattoir with residential areas and physical separation sector of chicken abattoir building with residential areas.¹³ Aspect of personal hygiene which was necessary to be reviewed more from behaviour sector of workers in processing room. Aspect of sanitation involving disinfection program and chemicals use which were not allowed for fresh products until packaging products.^{14,15}

The aspects which had to be regenerated as they were less supportive biosecurity management system were in quadrant III. It involved aspect of main construction from the chicken abattoir building from ceiling part from sector of roof component, sector of roof condition and sector of roof part structure, sector of walls of chicken abattoir building, height of the walls and corner angle between walls, sector of flooring material and condition sector of floors in processing room, sector of protector component of lamps, sector of lighting intensity in processing room and sector of capacity of sewer. Aspect of personal hygiene also needed improvement in the direction of sector of workers health condition in processing room. Aspects of personal hygiene include the condition of the employee in the process room should prevent from spitting and smoking and other things that can lead to cross contamination.¹⁶

Disinfection programs should be undertaken at all times in chicken abattoir as they will be related to hygiene for the environment and products. The disinfection program includes every vehicle that will enter the chicken abattoir, the equipment used to transport live chickens, shelters before slaughter, all the equipment used for the slaughtering process and surrounding buildings. Regular and continuous disinfection programs are important aspects related to biosecurity measures as an effort to prevent bacterial contaminants and impurities in fresh and packaged products.¹⁷

Aspect of facility also needed improvement involving toilet room condition, availability of hand-washing facility and leg-dyeing in processing room¹⁸, availability of hand-washing facility in toilet area, material sector of container and equipment, sector of container and equipment condition in processing room.^{13,19} Aspect of raw material, handling and processing also needed to be regenerated from sector of live animal handling compatibility, sector of live animal administration completeness, inspection of cutting process and condition of chicken carcass.^{20,21}

Handling of raw materials should be observed starting from the processing, packaging and storage of fresh products and the implementation of cooling by using the storage at 18°C in accordance with the provisions. Specifically, the storage process needs to be improved by monitoring the cooling of chicken carcasses using 18°C for chill room and 4°C for blaz

freezer facility.²² The cooling process can maintain the quality of chicken carcasses²³ and stored for a long time.²⁴

CONCLUSION

Measurement instrument of biosecurity application was compatible and able to be applied for small scale chicken abattoir. Biosecurity aspect application which has been conducted by small scale chicken abattoir involves fresh product storage, cooling implementation and processing room separation.

ACKNOWLEDGMENTS

The authors acknowledge Institute for Research and Innovation, Universitas Airlangga and Faculty of Veterinary Medicine, Universitas Airlangga for providing fund support to carry out this study.

COMPETING INTERESTS

The authors declare that they have no competing interests.

REFERENCES

1. Barlow SM, Boobis AR, Bridges J, Cockburn A, Dekant W, Hepburn P, Houben GF, Konig J, Nauta MJ, Schuermans J, Bánáti D. The role of hazard-and risk-based approaches in ensuring food safety. *Trends in Food Sci Technol*. 2015;46(2):176-188.
2. Kafetzopoulos DP, Psomas EL, Kafetzopoulos PD. Measuring the effectiveness of the HACCP food safety management system. *Food Control*. 2013;33(2):505-513.
3. Singgih ML, Kariana M. Peningkatan produktivitas dan kinerja lingkungan dengan pendekatan green productivity pada rumah pemotongan ayam XX. *Jurnal Teknologi dan Manajemen Lingkungan*. 2008;9(2):79-90.
4. Purnama MTE, Dewi WK, Prayoga SF, Triana NM, Aji BSP, Fikri F, Hamid IS. Preslaughter Stress in Banyuwangi Cattle During Transport. *Indian Vet J*. 2019;96(12):50-52.
5. Kusumaningrum HD, Riboldi G, Hazeleger WC, Beumer RR. Survival of foodborne pathogens on stainless steel surfaces and cross-contamination to foods. *Int J Food Microbiol*. 2003;85(3):227-236.
6. Thorkelsson A, Georgsson F, Gudmundsdottir E, Hardardottir H, Reiersen J, Gunnarsson E, Briem H. Freezing of poultry contaminated with *Campylobacter* as intervention against disease in humans. *Int J Med Microbiol*. 2003;293:147.
7. Purnama MTE, Prayoga SF, Triana NM, Dewi WK, Purnomoaji BS, Wardhana DK, Fikri F. Oxidative stress parameters in landrace pigs slaughtered by the stunning method. *IOP Conference Series: Earth and Environmental Science*. 2020;441(1):012140.
8. Phan HG. 'A race so different': Chinese exclusion, the slaughterhouse cases, and Plessy v. Ferguson. *Labor History*. 2004;45(2):133-163.
9. Li YL, Wang SW, Zhu M, Zhao Y, Wan B, Zhu BQ, Zhang Q. Study on technological points of EIA of butchery. *Environ Sci Surv*. 2009;3:25.
10. Haileselassie M, Taddele H, Adhana K, Kalayou S. Food safety knowledge and practices of abattoir and butchery shops and the microbial profile of meat in Mekelle City, Ethiopia. *As Pacific J Trop Bio-med*. 2013;3(5):407-412.
11. Kahrs RF. *Global Livestock Health Policy: Challenges, Opportunities and Strategies for Effective Action*. John Wiley & Sons. 2008;p65.
12. Ghazali I. Structural equation modeling metode alternatif dengan partial least square. *Badan Penerbit Universitas Diponegoro, Semarang*. 2008;p34.
13. Indonesia, S.N. *Rumah Pemotongan Hewan*. Badan Standarisasi Nasional. Jakarta. 1999;2333.
14. Qekwana ND, Oguttu JW. Assessment of food safety risks associated with preslaughter activities during the traditional slaughter of goats in Gauteng, South Africa. *J Food Protection*. 2014;77(6):1031-1037.
15. De Boeck E, Jacxsens L, Bollaerts M, Vlerick P. Food safety culture. In 20th National symposium of Applied Biological Sciences (NSABS 2015). 2015;32-36.
16. Qekwana DN, McCrindle CM, Oguttu JW. Designing a risk communication strategy for health hazards posed by traditional slaughter of goats in Tshwane, South Africa. *J South African Vet Assoc*. 2014;85(1):01-04.
17. Escanciano C, Santos-Vijande ML. Reasons and constraints to implementing an ISO 22000 food safety management system: Evidence from Spain. *Food Control*. 2014;40:50-57.
18. Sudarmaji S. Analisis bahaya dan pengendalian titik kritis (Hazard Analysis Critical Control Point). *Jurnal Kesehatan Lingkungan*. 2005;1(2).
19. Carey JB, Prochaska JF, Jeffrey JS. Poultry facility biosecurity. *Texas Farmer Collection*. 2005;51-54.
20. Tanner B. Independent assessment by third-party certification bodies. *Food control*. 2000;11(5):415-417.
21. McMeekin TA, Baranyi J, Bowman J, Dalgaard P, Kirk M, Ross T, Zwietering MH. Information systems in food safety management. *Int J Food Microbiol*. 2006;112(3):181-194.
22. Huang L, Xiong YL, Kong B, Huang X, Li J. Influence of storage temperature and duration on lipid and protein oxidation and flavour changes in frozen pork dumpling filler. *Meat Sci*. 2013;95(2):295-301.
23. Bhat ZF, Kumar P, Kumar S. Effect of skin, enrobing and refrigerated storage on the quality characteristics of chicken meat balls. *J Food Sci Technol*. 2013;50(5):890-899.
24. Martin JN, Brooks JC, Brooks TA, Legako JF, Starkey JD, Jackson SP, Miller MF. Storage length, storage temperature, and lean formulation influence the shelf-life and stability of traditionally packaged ground beef. *Meat Sci*. 2013;95(3):495-502.

Table 1: Score of biosecurity aspect of small scale chicken abattoir in Sidoarjo

No	Biosecurity Aspect	Score
1.	Location and environment	0.283
2.	Main building construction	0.850
3.	Facility	0.472
4.	Raw material, handling and processing	0.377
5.	Sanitation	0.188
6.	Personal hygiene	0.188
Total		2.362

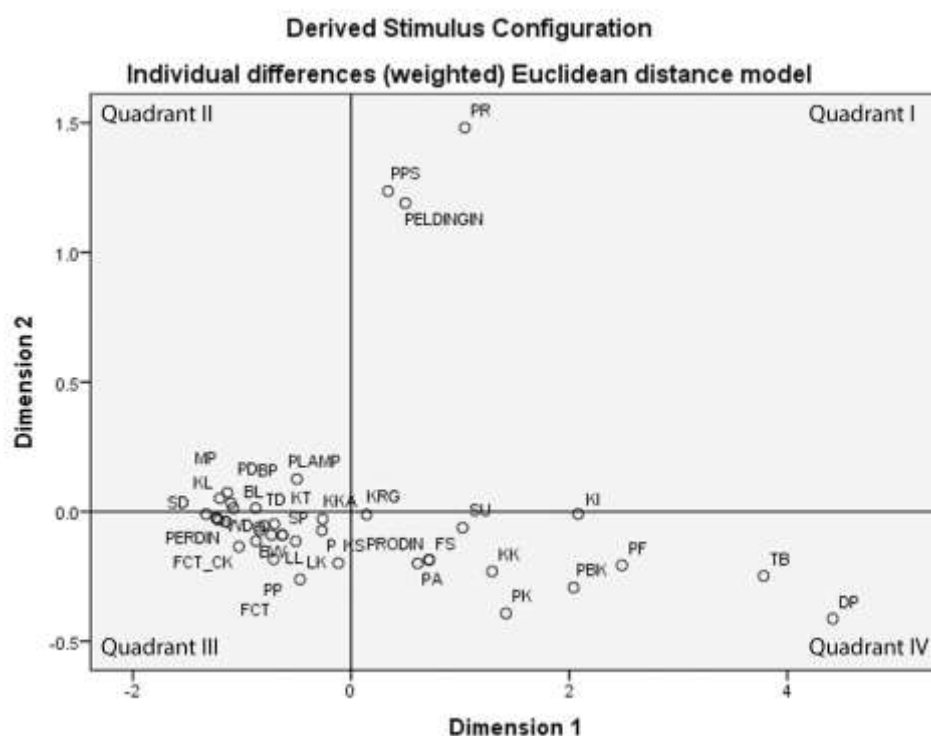


Figure 1: Result of MDS from biosecurity management system of small scale chicken abattoir in Sidoarjo

Remark:

Quadrant I involved: PELDINGIN = Cooling Implementation, PPS = Fresh Product Storage, PR = Room Separation.

Quadrant II involved: SD = Structure of Wall, LL = Ceiling, PLAMP = Protector of Lamp, KRG = Changing Room Condition, MP = Process Management.

Quadrant III involved: LK = Possibly Dirty Ceiling, KL = Condition of Ceiling, TD = Height of Wall, PD = Surface of Wall, WD = Colour of Wall, KI = Conformity of Permission BL = Material of Floor, PER DIN = Meeting Point of Walls, KOLAN = Condition of Floor, , P = Lighting, SU = Air Circulation, SP = Sewer, KS = Capacity of Sewer, KT = Toilet Room Condition, FCT = Hand- Washing Facility FCK = Leg-Dyeing Facility, FCT_CK = Hand -Wshing and Leg-Dyeing Facility BP = Material of Equipment, BW = Material of Container, KWP = Container and Equipment Condition, FS = Waste Facility, KA = Completeness of Chicken, , PHH = Live Animal Handling, PANTE = Antemortem Inspection, PP = Inspection of Cutting, KKA = Condition of Chicken Carcass, KK = Condition of Workers.

Quadrant IV involved: TB = Type of Building, PA = Area Separation, Dp = Near Residential Areas, PF = Physical Separation, PK = Behaviour of Workers, PRODIN = Disinfection Program, PBK = Chemicals Use.