

## A PRELIMINARY STUDY FOR DEVELOPING OPERATOR MANUAL FOR RUMINANT ABATTOIRS ON PREVENTION OF FOODBORNE DISEASES AND HALAL COMPLIANCE

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### ABSTRACT

**Introduction:** Foodborne diseases (FBD) can occur along the whole series of food production from the sources and processing until serving for consumers. Among the sources of food, meat is a major concern since it is come from animal origin where the pathogens might transmit to human and/or contaminate microbes from infected meat handlers to consumers at any time. **Background Study:** Abattoir operators – managers and workers, and the authorities – Veterinary and *Halal* officers, play the key role in conversion of live food animals to healthy and edible *halal* meat and useful animal products fit for human consumption. Abattoir operators, abattoir operating procedures including animal handling and meat process need to abide the standard operating procedures (SOP) as guided by the authority for the safety of meat in meeting the requirements for public health. It is also to be in lines with the *halal* rules and regulations from the perspective of Islam so that to achieve *halal* food and products which are beneficial for both physical and spiritual. **Problem Statement:** A number of researches have conducted in the prevalence of FBD but lack of prevention with combination of *halal*-compliance especially in ruminant abattoir areas. **Objective:** The researcher aims to do preliminary study for developing the required Operator Manual of Ruminant Abattoirs (OMRA) on prevention of FBD and also for *halal* compliance. **Method:** This preliminary study will be looking into the process of ruminant abattoir by literature search

if its premises, staffs, animal handling and the equipment used are in accordance with the *halal*-compliance and prevention of FBD. From visiting two abattoirs and online data sources, gathering relevant information for ruminant abattoir and *halal* meat of Malaysia is done. **Results:** Based on the preliminary findings, the three major accreditations of Malaysia which are MS1500:2009 guidelines of Department of Standards Malaysia, JAKIM (*Jabatan Agama Kemajuan Islam Malaysia/* Department of Islamic Development Malaysia) 2008 & 2011 Malaysian *halal* meat protocols, and DVS (Department of Veterinary Services of Malaysia) code of veterinary practice 2012 respectively. They are compared and analyzed to get the required information for further developing OMRA for the benefits of meat industry, health ministry, global *halal* market authority and all consumers.

**KEYWORDS:** Foodborne Diseases, Operator Manual, Ruminant Abattoirs, *Halal* Compliance

## INTRODUCTION

### Background of the Study

Foodborne diseases (FBD) are caused by pathogens through contamination by microbes, chemicals and other poisons and toxic substances into foods via animal origin or food handlers. Foodborne pathogens are hosted in the food chain beginning of production to end-users, mentioned as farm to fork. It can be occurred at any time especially in environments where food animal, fish and plants which transmitted diseases (Kirk *et al.* 2008; Hamer, *et al.* 2010). FBD are common even though the huge majority of cases are undiagnosed or unreported and seem as the top part of a very large iceberg. Therefore, Victor (2002) stated that the true incidence of FBD in Malaysia is unknown and it has been little effort in determining the magnitude of the causes. This study focuses *halal* compliance in meat process to highlight the possibilities of FBD causes, especially in ruminant abattoirs where slaughtered animals and carcass are handled by abattoir operators.

The *halalan tayyiba* principle is settled by Islamic Law - *Shari'ah* to ensure protecting the best dietary practice granted by Allah (SWT) and its concept need to be understood how to apply as a standard quality. Even though all parties involved such as consumer, government, manufacturer, supplier or businessman are responsible to achieve the whole food processing in line with *halalan tayyiba* as Anas *et al.* (2010) mentioned, a few party in the production or manufacturing business is giving consideration to it. Verifying the relevant documents and health and *halal* certificates in raising, feeding and transportation of slaughtered animals are important aspects of abattoir operation. Ruminant abattoir operators - managers and workers, of Malaysia are among the parties who need to put the practices and concept of *halalan tayyiba* in their routine works. Thus, being a Muslim and being a Veterinary lead the researcher to do this preliminary study for a novel dissertation in achieving healthy and safe meat products with *halalan tayyiba* by developing OMRA in term of FBD prevention. It will be beneficial not only Muslims but also to all consumers, people in meat industry, health ministry and to the Nation by providing required information for prevention of FBD.

### Three Major Accreditations of Malaysia in Meat Production

The Department of Islamic Development Malaysia which is known by the acronym of its official Malay name - JAKIM (*Jabatan Agama Kemajuan Islam Malaysia*), established by the Government of Malaysia for *halal* standards and certifications in Malaysia and international on the facilities has been issued Malaysian protocol for *halal* meat production since 2008 and for *halal* meat and poultry productions in 2011. It is currently noted that JAKIM is still in the process of centralization all *halal* department for each state. By means each state should follow JAKIM *halal* certification process flow (Iskandar *et al.* 2015). Besides JAKIM, most of the States have *halal* authorities such as *Jabatan Agama Johor* (JAJ) for Johor state, and *Jabatan Agama Islam Pahang* (JAIP) for Pahang State, and they take responsible in handling all the *halal* certification process.

To benefit the health, to safe the public and to protect the consumers are parts of the main functions of the Department of Standards Malaysia, and so Malaysia Standards (MS) are developed by committees. In 2009, MS1500 is produced for *halal* food – production, preparation, handling and storage (second revision) as a guideline. Moreover, Department of Veterinary Services (DVS), Ministry of Agriculture and Agro based Industries (MOA) established code of veterinary practices for ruminant abattoirs in 2012.

The above JAKIM 2008 & 2011 protocol, MS1500:2009 and DVS code of practices 2012 are three major accreditations in Malaysia which are supposed to serve as the guidelines of abattoir operators. Even though these protocol and code are prescribed separately, it is still needed to get a proper operator manual according to international standards. Thus, the preliminary study on those important guidelines (MS, DVS code & JAKIM protocol) are done for required information in developing OMRA.

### **Role of Veterinary Officers, Meat Inspectors and *Halal* Officers**

Veterinary officers and DVS meat inspectors are in position of opportunity and responsibility to ensure the health and wellbeing of people by protecting food security and safety (Saleha and Latiffah 2015). At the same time, they constitute a major group with abattoir operators at risk of occupational zoonosis, due to the close contact exists between them and animals/tissues of animals during slaughtering or processing (Mahendra *et al.* 2013). Hence, the perceptions of veterinary officers and meat inspectors together with *halal* officers on awareness and practices of abattoir operators are required to find out.

In Malaysia, the objectives of abattoir complexes are 1. To promote entrepreneurship and sustainable growth of livestock based industries and 2. To ensure the development and operation of the slaughterhouse comply with the norm of hygiene and food safety and environmental quality and preserve the welfare of livestock (DVS Official Portal 2017). Here, it is highlighted that abattoirs are the major points of checking by veterinary officers and DVS meat inspector for prevention of FBD. In addition to it, the role of *halal* officer or *halal* checker also will be played as major role in order to ensure using the method of *halal* slaughtering. Thus, the roles of vet, meat inspector and *halal* officer are important to serve for each abattoir as an important inspection area of the country against public health problems as well as economic loss via culling/depopulation of animals and damaging businesses.

### **Statement Of The Problem**

In today's fast-paced world, incidents of deadly zoonoses - diseases spread from animals to people (Cynthia & Scott 2007) outbreak may occur anytime and affect everyone. FBD also come from animals through meat handlers as the form of zoonoses or most of the cases are related with domestic and farm/food animals. It is especially more common in developing and tropic countries. The potential risks of FBD and zoonoses include the bacterial diseases such as *E.coli*, and *Salmonella*. Mahendra *et al.* (2013) pointed out that many zoonotic diseases of multiple causes are come across among workers of abattoir where the slaughter of different species of food animals is involved for human consumption and some other purposes.

One of the responsibilities of abattoir operators includes handling and slaughtering of the animals to be able to produce *halal* quality meat product with free of FBD. It can be assumed that if slaughterhouse operators have awareness of the ethics of SOP and have skills in process of slaughtering ruminants, the meat produced will be healthy and safe for consumption of public. If the needed procedures and protocols are not followed in slaughtering process, the risks of FBD and unqualified meat products may result which can adversely affect the health status of those who consume it. Furthermore, Shamsul *et al.* (2016) explored that inappropriate hygienic practices by the abattoir workers often lead to cross contamination of the cattle carcasses and thus microorganisms of different species such as yeasts and moulds are implicated in the spoilage and contamination of meat and its products.

In terms of prevention and precaution of FBD, some form of code of practice such as veterinary practice and *halal* practice for operators are prescribed to follow in abattoir process which includes

preparation with safety measures, handling, restraining and killing of animals. However, the researcher discovered that the existing veterinary code of practice, JAKIM *halal* meat protocol and MS guidelines on *halal* food are not fully cover for abattoir operators. A combination of these three guidelines plus international standard need to be developed and so the researcher will contribute to do it by this preliminary study for developing OMRA accordingly.

In a study by Ahmad Sahir (2014), it is noted that awareness for *halal* food is considerably low among the population in Malaysia due to lack of exposure in the education system, it can be seen through the number of cases related to *halal*. As results, the needs for *halal* food that meet up to the standards are ever more increasing. Anas *et al.* (2010) also concerned that each and every one of Muslim consumers are not possible to make self-investigation fully for a food or service whether it is in line with *halalaltayyiba* or not. According to Islam, it is the responsibility for both of an individual as *farḍhu ain* and of the experts and community as *farḍhu kifayah*. This shared responsibility (*Fardhu kifayah*) should be taken by of among others such as producers, businessmen, government or non-governmental organizations and consumer associations.

If not follow the correct procedures and guidelines, an abattoir is a place which can potentially harbors various pathogens and may spread to other slaughtered animals or humans since it deals with animals from different background and the chances of getting infection is high. These abattoirs have to abide the procedures and code of practices in slaughtering process guided by the veterinary and religious authorities. Thus, a need to conduct this study is a must to examine the abattoir operators' practices and awareness on FBD prevention and *halal* compliance as the fundamental requirements for abattoir establishments.

### **Purpose Of The Study**

This research sought to fill the requirement of meat industry and health ministry for ruminant abattoir operators who are responsible to hold the meat safety and *halal* status and animal welfare as well in order to prevent potential FBD and being *haram* that is not being *halal*. The purpose of this preliminary study is to examine the existing guidelines on meat industry in Malaysia for further developing a proper OMRA on prevention. By discovering the contexts and requirements of each existing guidelines in line with world guidelines as international standard, it is to be developed Operator Manual for Ruminant Abattoirs (OMRA) in Malaysia on prevention of FBD and *halal*-compliance.

With the findings of this preliminary study on guidelines for ruminant abattoirs, the research will be continued to identify the gaps between existing standard guidelines. It is actually required to recommend on developing 'operator manual for ruminant abattoir' (OMRA) from Islamic perspectives (including JAKIM) and veterinary/scientific views (including DVS, MS) by ensuring the way to be free from FBD and by following *halal* compliance.

### **Limitations Of The Study**

Among all domesticated animals, the researcher will be worked on only ruminant animals that are not included swine, poultry, dogs and cats due to the limitation of time and priority. It is a preparation to find the actual understanding of ruminant abattoir operators and hence it is skipped from laboratory tests and clinical trials which should be done as further studies by other researchers. It is specially focused on available online data sources and field study within the capability of researcher. The further study will be needed with the use of request and report of government offices.

## **RESEARCH METHODOLOGY**

In order to develop operator manual for ruminant abattoirs, this preliminary study is more concentrated on existing protocols, principles, procedures, code of practices, and guidelines available in Malaysia. The method of this study is searching literature sources from online database, from official portal pages of

respective departments of Malaysia and also visiting two abattoirs for preliminary survey. In order to get more comprehensive understanding on this preliminary study, the researchers develop two frameworks to highlight the importance of guidelines on ruminant abattoir operation as follow;

### Theoretical Framework

The meats we eat are taken from animals who are supposed to be taken care under meat industry which is mainly organized by livestock sector of Agriculture Ministry. The people who eat the meats are required to get their health and welfare from Ministry of Health. Meat industry and health ministry are required together with religious authority for meat safety from quantity, quality and *halal* perspectives. Meanwhile, managers and workers of ruminant abattoirs who operate the slaughter process to produce meat and other related products from food animals play major role to fulfil the above requirement. Abattoir operators of meat industry require cooperating with members of health ministry and *halal* authority for meat consumers and this connection is defined in the following flow chat.

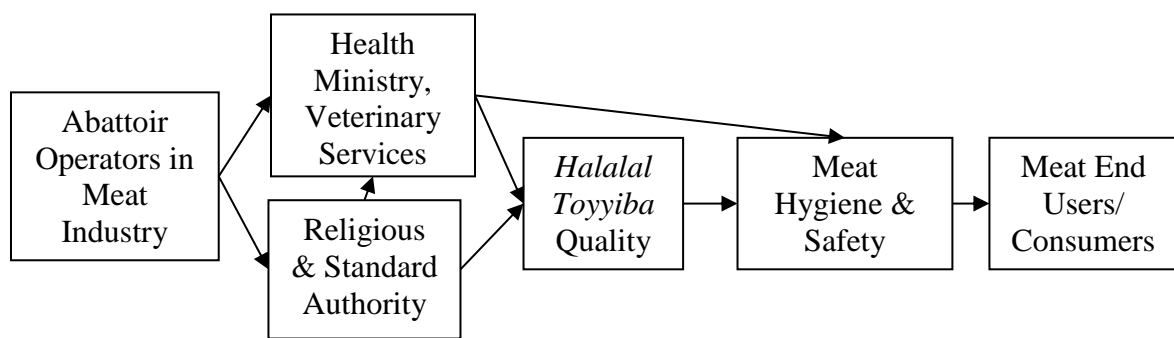


Figure 1 The Role of Abattoir Operators towards Meat End Users

### Conceptual Framework of the Research

The goal to achieve the OMRA that is Operator Manual for Ruminant Abattoir is to provide the fulfilment for requirement in meat industry, health ministry and Islamic *halal* body. The conceptual framework is as follow.

### PRELIMINARY RESEARCH FINDINGS

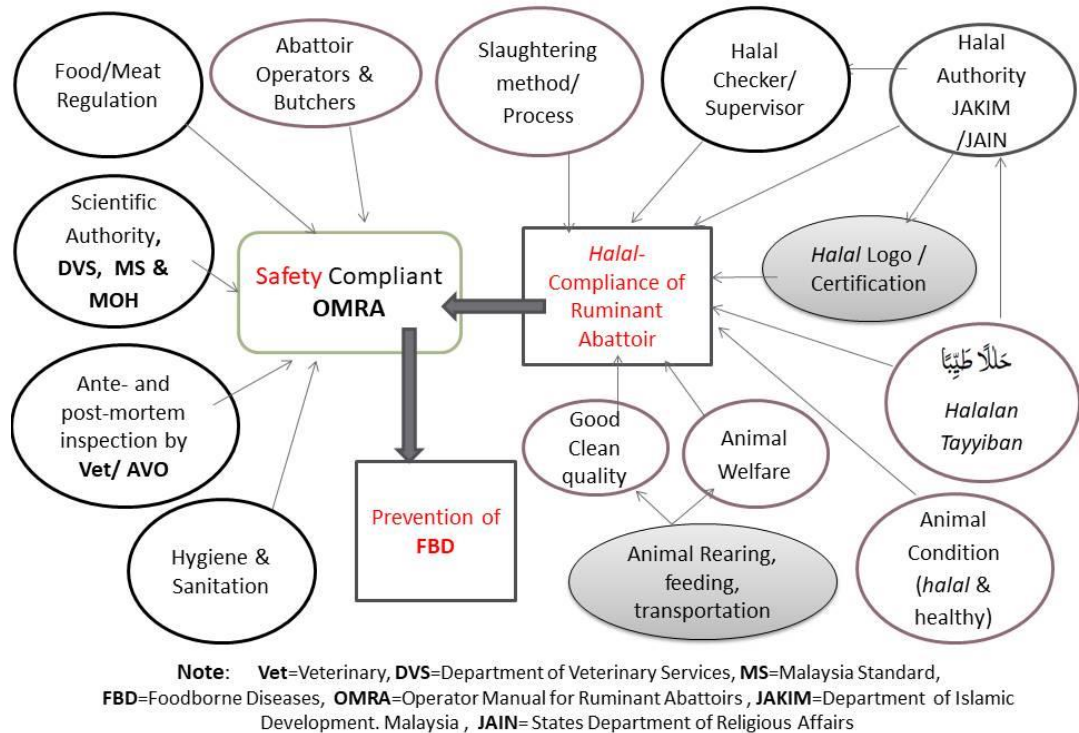
Based on the discovery of existing guidelines on ruminant abattoir for prevention of FBD and for *halal* compliance, the three departments in Malaysia are taken consideration as the most obvious and official publications. They are Department of Standards Malaysia, Department of Islamic Development Malaysia (JAKIM) and Department of Veterinary Services. Their latest and available guidelines are compared as shown in table 1, and analyzed to find similarities and differences for further adding important points according to the international standards. The numbers of definitions in each guideline are listed as shown in table 2. In addition to it, the World guidelines for meat industry are also collected to compare with Malaysia existing guidelines.

Five world guidelines on meat industry are discovered in terms of meat safety as follows;

1. Health and Safety Guidance Notes for the Meat Industry (bupa. British Meat Processors Association, 2014)
2. Abattoir Development: Opinion and Designs for Hygienic Basic and Medium-sized Abattoirs (Heinz, Gunter of FAO, RAP 2008)
3. CHPM @ Code of Hygienic Practice for Meat: CAC/RCP 58-2005

4. FAO Animal Production and Health Manual: GPMI @ Good Practices for the Meat Industry (2004)
5. Guidelines for Humane Handling, Transport and Slaughter of Livestock (FAO, HIS 2001)

Among five of the above, two - GPMI & CHPM, described definitions and they are compared as shown in table 3 respectively for the required points to be added in developing OMRA in Malaysia as a one of international standard.



**Figure 2** Framework of Developing Operator Manual for Ruminant Abattoir

**Table 1** Comparing Contents of MS1500:2009, JAKIM Halal Meat Protocol 2011 and Code of Veterinary Practice CVP01/2012

MS1500:2009 Halal Food Guidelines	JAKIM Halal Meat Protocol 2011	DVS Code of Veterinary Practice 2012
Committee representation (page number)ii	Committee (page number) 3	Foreword (page number) 1
Foreword iii	Foreword 4	1 Objective 2
1 Scope 1	1 Introduction 5	2 Scope 2
2 Definitions 1	2 Scope 5	3 Definitions 2
3 Requirements 3	3 Definitions 5	4 Location 2
3.1 Management responsibility	4 Requirements	5 Unloading and Holding Area 3
3.2 Premises 3	4.1 General Requirements	6 Building 3
3.3 Devices, Utensils, Machines and Processing Aids 4	4.2 Dedicated Halal Establishment	7 Slaughtering Animals and Processing Carcass Area 4-6
3.4 Hygiene, Sanitation and Food Safety 4	4.3 Internal Halal Control System	7. Stunning, Slaughtering, Bleeding
	4.4 Permitted Animals	7. Dehydrating Area

3.5	Processing of Halal Food 5	4.5	<i>Halal</i> Slaughter	2
3.5.1	Sources of Halal Food and Drink 5	4.5.1	Stunning	7. Evisceration Area
3.5.2	Slaughtering Process 6	4.5.2	<i>Halal</i> Slaughtering Procedures	3
3.6	Storage, Transportation, Display, Sale and Servings of Halal Food 10	4.5.3	Determination Of Death	7. Inspection Area
3.7	Packaging, Labelling and Advertising 10	4.5.4	<i>Halal</i> Check	4
4	Compliance 11	4.5.5	Dressing Operation	7. Splitting Area
5	<i>Halal</i> certificates 11	4.5.6	Deboning And Packaging	5
6	<i>Halal</i> certification mark 11	4.6	Storage	7. Carcass Final Wash Area
Table A1	Guideline parameters for electrical stunning of chicken and bull 13	4.7	Transportation	6
Table A2	Guideline parameters for electrical stunning of other animals 13	5	Responsibilities 11	7. Chiller and Freezer (if available)
Figure 1	Slaughtering part for chicken 8	5.1	Establishment	7. Cutting Area (if available)
Figure 2	Method of slaughtering chicken 8	5.2	<i>Halal</i> Certification Body	8
Figure 3	Slaughtering part for cattle 9	5.3	<i>Halal</i> Slaughter Man	8 Worker Room, Storage and other Facilities 7
Figure 4	Method of slaughtering cattle 9	5.4	Muslim <i>Halal</i> Head Checker	9 Structural Component of Premises 7-9
Figure A1	Diagram of skull and placement for pneumatic stunner 14	5.5	Muslim <i>Halal</i> Checker	9. Internal Walls
Annex A	Requirements on the use of stunning in slaughter of ruminant and poultry 12	5.6	Muslim <i>Halal</i> Supervisor	1
Annex B	Method of ritual cleansing according to Shariah law for najas al-mughallazah 15	5.7	Competent Authority Of The Exporting Countries	9. Floor
	Bibliography 16	6	Non- Halal Conformance 14	2
		7	<i>Halal</i> Certification 15	9. Ceilings
		8	ANNEX A 16 ANNEX B 18	3
			** Comparison of definitions in each department of Malaysia guideline - MS, JAKIM & DVS is provided as shown in table (1.2)	9. Windows
				4
				9. Doors
				5
				9. Overhead Structures
				6
				10 Hygiene and Sanitation in Abattoir 9
				11 Conduct of Workers 10
				12 Conduct of Visitors 11
				13 Waste Treatment 11
				14 General 12
				*** Comparison of definitions in two World guidelines (GPMI of FAO and CHPM of RCP) is also described as shown in table (1.3) respectively.

**Table 2** List of definitions in *halal* meat and abattoir practices of MS, JAKIM & DVS

No.	MS 1500:2009	JAKIM 2011 Halal Protocol	DVS 2012 CVP (A)
1	Shariah law	Abattoir/slaughterhouse	Stunning
2	<i>Halal</i>	Carcass	Evisceration
3	<i>Halal</i> food	Establishment	Red offal
4	<i>Najas</i>	Halal certification body	
5	Slaughtering	Non-halal conforming slaughtering	
6	Competent authority	Poultry & ruminant	
7	Premises	Stunning	



**Table 3** List of definitions in GPMI of FAO 2004 and CHPM of CAC/RCP 2005

No.	Definitions of Term used in Abattoir Sector of Meat Industry from CHPM <sup>1</sup> & GPMI <sup>2</sup>			
1	Ante-mortem inspection	Disinfection	Official inspector	Sticking/exsanguination
2	Post-mortem inspection	Dressing	Pathogen	SRM <sup>3</sup>
3	Competent body	HACCP <sup>4</sup> system	Preventive measure	stockman
4	Contamination	Hazard	QA <sup>5</sup>	SHC <sup>6</sup> - consumption
5	Corneal reflex	GHP <sup>7</sup>	Risk	Undesirable substances
6	Condemned	Inedible	Shackling	Verification
7	Disease/ defect	Meat hygiene	Sterilize	Zoonoses

<sup>1</sup> Code of Hygienic Practice for Meat <sup>2</sup>Good Practices for the Meat Industry <sup>3</sup>Specified risk material, <sup>4</sup>Hazard Analysis Critical Control Point, <sup>5</sup>Quality assurance, <sup>6</sup>Suitable for human, <sup>7</sup>Good hygiene practice

## CONCLUSION

Upon this preliminary finding from reading of the above local and international guidelines on meat industry, it is noted that a proper operator manual for ruminant abattoirs in Malaysia is undeniable required to be developed for prevention of FBD and also for *halal* compliance. Thus, the researcher wants to highlight that the Malaysia meat industry will be more beneficial with the applicable operator manual for ruminant abattoir (OMRA) by adopting required international standards to the integration of MS1500:2009 guidelines, DVS code of veterinary practice for ruminant abattoirs and JAKIM Malaysian *halal* protocol for meat production.

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