

## HALAL RISK CONTROL AT THE UPSTREAM LEVEL OF THE BROILER CHICKEN SUPPLY CHAIN

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### Abstract

Halal Assurance System (HAS) was developed over the past 6 years and has undergone several changes and enhancements in terms of its policy requirement in 2019 by JAKIM. However, the implementation of HAS in the poultry industry only discuss the development of this system at the slaughtering stage and also produces downstream of chicken products only. Therefore, there are still no studies that focus on the implementation of HAS at the upstream level of the halal food supply in livestock farms although much research has been conducted. The basic criteria emphasized in the HAS is the determination of the halal control point at each step or process involved. For example, there are five elements in the farming of broiler farms that have been identified as halal risks consisting of food and beverage, medical, farm biosecurity and infrastructure, and logistics were proposed by the authors. Therefore, the qualitative methodology approach through documentation analysis is used to obtain sources of information to discuss the importance of HAS and to explain the elements of halal risk control (HRC) in poultry farming activities. Implementing of this systematic system can also help the industry especially in the livestock sector and the implementation of halal certification policies makes it a key in maintaining the transparency and halal integrity to benefit the consumer starting from the upstream level of halal food supply chain. The study also suggested that the HAS be applied in the poultry sector in future and that it would also have a positive impact if it was implemented in other livestock activities such as others ruminant animals and fish which it is a main supply of halal meat to the Muslim communities in Malaysia.

**Keywords:** Halal Assurance System, Broiler farm, Halal Risk Control.

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### INTRODUCTION

Recently, the implementation of the Halal Assurance System (HAS) in particular by the halal food industry players in Malaysia is considered to be very important in securing halal status for halal food products. In general, the system does not focus on the goal to require recognition from JAKIM about halal certification, but it is seen as having the importance to increase the level of consumer confidence in halal food products and its one of the benefits to the management of existing halal systems (Ceranac & Bozinovic, 2009; Muhammad Mazuan & Zalina, 2018). The implementation of the HAS also has the potential to positively influence the production of food products based on the concept of halal *thoyibban* (HT) as well as promising integrity and not cause harm to human health (Hassan, Arif, & Sidek, 2015; Rahman & Abdul, 2017).

Besides, the HAS sets out the principles of halal system management that are developed comprehensively from the concept of the food chain, "From Farm to Consumer". Therefore, the industry is required to provide HAS procedures and provide them as guidelines to meet the requirements of Halal certification and certification of halal integrity (Shafii & Zain, 2015). The establishment of a halal risk control (HRC) is one of the key elements that should be developed and become as a backbone of HAS management in which each step of the process will be studied based on the concept of HT on food products (Kohilavani *et al.*, 2013; Syed Fazal Ur Raheem, Neio, & Demirci, 2018).

Therefore, the main objectives of this concept article are to understand the importance of the HAS implemented and to identify the elements of HRC that need to exist at the upstream or early stages of the broiler industry. This study uses a qualitative methodological approach which is through document analysis that includes literature sources such as guidelines and past research paper related to the HAS as well as broiler chicken farming activities. Overall this resource study can provide a clearer picture and input on the issues and importance of the HAS and its halal control especially in poultry industry.

### PROBLEM STATEMENT

The issue of consumption of halal food and beverages has become a polemic recently in Malaysia as well as by Muslim consumers and among Islamic scholar's (Fadzillah *et al.*, 2011; Arif & Sidek, 2015). The demand for halal food products in the world market and also Malaysia is increasing due to the reliability and integrity of the halal products towards the products based on the halal concept (Suhaimi, 2005; Hamidon & Buang, 2016). As demand of food by consumers increase and using advance food technology nowadays, the food production becomes more complex and the halal concept is more difficult to be identified (Raheem & Demirci, 2018). Hence, a quality management system in terms of the context of halal be introduced so that it can assure the process products or raw materials not contaminated with the haram material which can halal integrity called HAS. Most of the issues related with livestock animal farming activity, the some farmers intentionally

feed with waste of *Mughallazah* animal. In view of the rapid growth of the livestock industry in Malaysia, many drastic approaches have been taken by the farmers to optimize their production by providing dirty and impure food to the livestock at a lower cost. This involves providing food that sources impurities to livestock known as *al-Jallahah* animals (Jamaludin *et al.*, 2017).

Looking at the context of HAS implementation at broilers farming, the halal control only focuses at the stage of transferring live chickens from the farm to the slaughtering house (Omar *et al.*, 2012). Supported by Mochtar, Amirnordin, and Haron (2014) explains that the use of HT concept of halal products be supplied and produced in the supply chain must undergo strict monitoring starts from the upstream of supply chain. This is consistent with the practice and also HAS implementation focused on the broiler farm level to be give benefits to the industry players and consumers to produce quality raw material based on halal and food safety systems.

Based on the implementation of HAS have been discuss on past research especially on slaughtering process and further process chicken product, but this system be not discussed in detail at broiler farm operation level. Therefore this concept paper will discuss more in depth the importance of HAS needs and recommend halal risk control points in the broiler industry sectors involving the chicken growth process until to slaughtering process.

**RESEARCH OBJECTIVES**

This study highlights two main objectives to be achieved:

1. To know the importance of Halal Assurance System be establish in the broiler industry.
2. To suggest the halal risk control points involved in the broiler industry sector.

**RESEARCH QUESTIONS**

Based on the objectives stated, the reaserach question for this study are as follows:

1. What is the importance Halal Assurance System in the broiler industry?
2. What are the halal risk control points involved in the broiler industry?

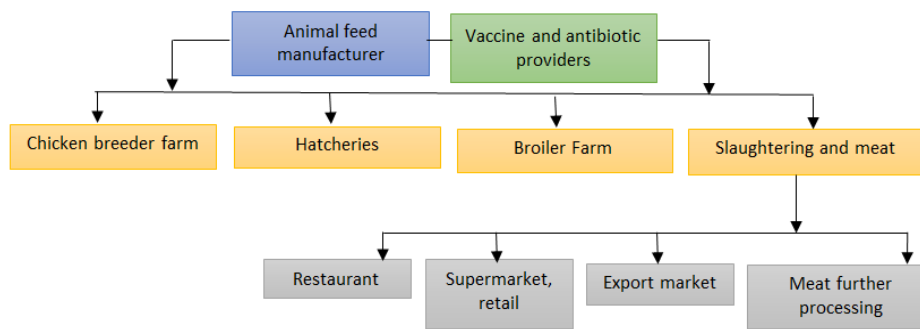
**LITERATURE REVIEW**

**The Background of Broilers Industry in Malaysia**

The products of poultry-based and also processed raw poultry products are synonymous with raw material resources and food menu in Malaysian society. In particular, the poultry meat products are come from commercially raised breeds to meet consumer's demands to source a meat protein other than eggs in their menu diet. The broiler chicken is mostly be raised in a specially built compound area to carry out all livestock animal activities along with a systematic management system to produce a safe meat product to consumers. According to the history of the origin of the two-legged organisms of birds, they generally originate from a species of domesticated birds, in the scientific language known as '*Gallus gallus domesticus*' where the subspecies is '*Red Junglefowl*' (Dohner, 2001; Appleby, Mench & Hughes, 2004). Later, the chicken species have been carried out in several crosses breeding using hybridization technology, resulting in the breed of broiler chicken that exhibit rapid growth, disease resistant, having fast growth rate and provides highly quality meat (Jamilah, 2015).

In relation to the development of the early broiler poultry breeding system in Malaysia, the chicken been take care in a cage at night time. This system has undergone changes over the years due to the high demand for chicken meat, the farming system have changed to a more comprehensive system which usually grown in large number of flocks under intensive condition. This system involves raising the chickens in specific barn or cages to protect the livestock from any external risk such as wild animal and zoonotic disease. This intensive farming system especially in broiler farm also involved automated feeding and drinking supply medicines and other facilities be provided at the same place (Premier, R. (Ed.), T; Hassan & Raiyana, n.d; Veterinary Services Department, 2006; Youn, 2012; Ariffin *et al.*, 2015; Baluch *et al.*, 2017).

Mostly in Malaysia, management in broiler industry operates to produce broiler livestock act as '*integrator*' which provider owned and controls all chain of broiler farming including feedmill production, egg production, breeding farm, hatcheries, broiler house and meat processing plant. As such, this system is better known as the vertical integrations system (QSR Trading Portal, 2013; Serin *et al.*, 2011). Overall broiler industry has been growing rapidly in Malaysia and integration operation can be shown in figure 1.0 below:



**Figure 1.0: Integration System of Poultry Farming Industry in Malaysia (Reported by Serin *et al.* (2011).**

**Requirements of the Halal Risk Control at the Broiler Farm**

The implementation of HAS was seen as a new system introduced primarily to the food industry in Malaysia. But its implementation is still less seen specifically discussed or its involvement in the halal animal husbandry industries. According to previous studies that have been done before, determination 'Halal Risk Control Point' (HRCP) more focused on the selection of raw materials until finished product, particularly in processing of raw chicken meat, food manufacturing and logistics sectors,

which covers all aspects of the food supply chain. Basically, this HRCP adapted from a food safety system that is used by the food industry worldwide such as '*Hazard Analysis Critical Control Point*' or HACCP system (Sani & Dahlan, 2015; Dahlan and Sani, 2016). Generally in Malaysia, the HACCP system was implement along with the MS1480 standard (Second Revision) which published in 2019 (Department of Standard Malaysia, 2019). Based on this guidelines, critical control point is defined as a point, operation or process steps in the food chain where control

measures designed to prevent any preventive food safety hazards to acceptable levels.

According to Kohilavani *et al.*, (2013), Lau, Jamaludin, & Mei Soon (2016), Rejaii & Arianfar (2016) dan Demirci *et al.*, (2016), the combination of HACCP principles with halal concept was seen as a backbone in the development of HAS. Therefore the usage of this combination system will give advantage towards the integrity of halal status and at the same time to assured the food safety level free from any contamination of haram substances. From Demirci *et al.*, (2016), stated that implementation of halal been used with HACCP system was still a new aspect in halal assurance management. Hence, with the combination between this halal and HACCP system will give a significant impact on halal status of food products. Conversely, that this system had some of weaknesses if it is be implemented. One of it was the difference in the interpretation of the halal concept and system between different Muslim scholars and authorities (Demirci *et al.*, (2016),

To develop the HRCP at step or process involved, there is a specific procedure used to ensure that the halal control is clearly be identified so that the integrity and also risk can be observed throughout the earlier stage of the food chain. In the meantime there are several opinions given by the previous studies on the method of determining halal control points at each step of the process involved. According to Purnomo *et al.*, (2018) it is stated that halal control points can be identified if raw materials and processing methods be analyze based on shariah principles through al-Quran sources and hadiths as key guides. It is supported by Shahdan *et al.*, (2016) states that a halal control points are identified and determined through '*Halal Decision Tree*'. According to him in developing halal control in process step, it must based on al-Quran and hadiths source and together applying five categories of shariah law such as (1) *Fardu* (Compulsory), (2) *Mandub* (Circumcision), (3) *Jaiz/Mubah* (Must), (4) *Makrooh* and lastly is (5) *Haram* (Forbidden).

Next according to Kohilavani *et al.*, (2013) and Mohd Bakri, Maarof & Norazmir (2017) also states that before the halal risk be determined, the process step that has possibility potential of haram elements are analyzed by through a '*Halal Decision Tree*' methods which is a main procedures to determine the process step is whether a control point or not. Based on HAS guidelines establish by JAKIM, it's only mentions to establish halal control in HAS requirements but the question in mind is what the correct procedures or instrument be used not clearly discussed to develop HRCP. In other words, this aspect especially to determine appropriate halal risk at certain steps or point is not by simply guessing. It's should be done by using specific guidelines to determine a potential risk in halal status.

However, in this study, there are instruments that are considered appropriate to determine HRCP particularly in the rearing of broiler chickens. The said instrumentation method is the '*Halal Control Point Risk Matrix Assessment*' which obtained from the Malaysian Halal Standard MS 2400-1: 2019 (*Halalan Toyiyiban-Management System Requirements for transportation of goods and services chain cargo- First Revision*) (Department of Standards Malaysia, 2019). Based on this standard there are some guidelines to define halal control points systematically ways. Even in this risk matrix table had mention that the degree of potential haram risks (*likelihood*) and the severity risk (*impact*) be explained by halal risk levels which are likely possibility exist at every step of the process.

In addition, there is also a descriptions on risk classification based on the risk ranking level along with risk classification code. Therefore, based on these guidelines the authors conclude that the best methods to assess halal risk and identify HRC at broiler farm level is by using halal risk matrix table. However, in this article the authors focus only on the components of poultry

breeding activities that are the main factors that may influence their eligibility status at the upstream level on poultry supply chain. Among the proposed HRC in broiler farming activities consisting of five components namely animal feed sources, medications, farm infrastructure, farm biosecurity systems and logistics transport.

## HALAL RISK CONTROL IN POULTRY BREEDING SECTOR

### Animal Feed

To determine of halal assurance at animal husbandry sector such as broilers, animal feed meal are very important because it is crucial element in determining HRC. Usually industrial wastes from slaughterhouses such as chicken blood, feathers, fats and carcasses are recycled to produce animal feed which is high in nutrient content and necessity in contributing to the growth of poultry (Mead, 2004). Looking at the perspective of Shariah concept, the haram substances used in animal food are categorized as impurities and and this poses a hazard to consumers' health. This is clearly stated in the Qur'anic verses regarding the forbidden source of food. Allah said:

"He has only forbidden to you dead animals, blood, the flesh of swine, and that which has been dedicated to other than Allah. But whoever is forced [by necessity], neither desiring [it] nor transgressing [its limit], there is no sin upon him. Indeed, Allah is Forgiving and Merciful (Al-Baqarah Verse 173)

"He has only forbidden to you dead animals, blood, the flesh of swine, and that which has been dedicated to other than Allah . But whoever is forced [by necessity], neither desiring [it] nor transgressing [its limit] - then indeed, Allah is Forgiving and Merciful" (An-Nahl Verse 115)

In the livestock industry, the issue of feeding animals with substances that do not meet Islamic law has been widely discussed in Malaysia. Among them are the using of internal organs, from livestock farms and pig waste sewage that are the main source of livestock feed. This is because most farmer enterpreneurs take such measures to reduce production costs as well as less exposure and lack of understanding on concept of halal in the halal production (Saidin *et al.*, 2017).

The feed production issues is also be given attention which is the source of raw materials used to produce animal feed. Concerning on Shariah perspective through Jamaludin *et al.* (2017), emphasizing that livestock should be given good and nutritious food and drinks so that the meat is halal, uncontaminated and it give benefit to consumer. From the context of feeding, if farm animal was given unattentionally with contaminated with haram material continuously, then automatically that animal itself is haram (forbidden) to consume. Next, related to the issue of livestock feeding with the level of safety on animal feed that addresses on concept of halal. According to Abdullah, Khaled and Ahmed (2010) explained that animal feed containing with high levels of *aflatoxins* and *heavy metals* able to harm to the livestock health and growing process will be disrupted and may lead to cardiovascular system attacks, kidney failure and even bone disease the weak. Therefore, the safety issue of animal feed should be emphasized so that it is safe and does not give negative impact on animal health and may have adverse effects also on human health.

Furthermore, the issue of livestock feed products production by modern technology innovation to produce a feed meal using a genetic engineering technology (Ikram & Mohd Azam, 2014). This technology refers to genetically modified organisms (GMO's) which involve modifying the genetic structure of an organism and performing genetic enhancements on other organisms and thus generating new variants or species (Robert, 2008). Generally, the aspects of using GMO's technology on animal feed have advantages and also disadvantages that affect the economy

and human health. On the negative side, the use of GMO's based food products could be at risk for adverse effects on consumer health, including allergic effects, lowering resistance to antibiotics and give effects to environment (Siti Fairuz & Latifah, 2017).

### Medication

Zoonotic disease is a serious threat to broiler farming activities. The effects of the spread of the disease can lead to obstruction of growth, efficacy, and low rate of food intake as well as high mortality of broiler chickens. The prevention of disease is an important aspect in raising a quality livestock and providing good health in broiler farm management. The giving medication such as of vaccines and antibiotics for livestock is a priority for ensuring good health of livestock. Vaccines are generally defined as biologic ingredients to enhance immunity to a disease and vaccines contain agents that resemble organisms that cause disease, whether they are weakened or deactivated. The agent will then stimulate the body's immune system to recognize the agent as an impediment and thus protect the host from infections (Veterinary Services Department, 2015).

According to Roth (2011), it is found that the use of vaccines on animals is efficient methods in the production of livestock products to control the transmission of infectious diseases from livestock to humans. Vaccination is not only focused on the health aspects of animals, but it can also reduce the risk of meat contamination by harmful pathogen bacteria that affect the quality and food safety (Wijaksana, Razak & Singh, n.d). Some of the most common types of viral infections in poultry in the field are *Newcastle disease*, *Avian Influenza (AI)*, *Infectious Bronchitis*, *Infection Bursal Disease*, *Marek's Disease*, *Infection Coryza*, *Laryngotracheitis Infection*, *Egg drop Syndrome*, *Fowl Pox* and *Fowl Cholera* ( Department of Veterinary Services, 2015).

Next on the use of antibiotics used in the poultry industry. Antibiotics are defined as substances of a veterinary drug produced by microorganisms through chemical synthesis at low concentrations to inhibit growth or kill microorganisms. It also used to stimulate growth and prevention of disease (Department of Veterinary Services, 2011). According to Marni, Marzura & Suliana (2017), state that antibiotic or veterinary drugs are part of different classes of chemicals that function to prevent any virus or bacterial infection and also minimize the potential for reoccurrence infections in livestock. Accordingly, if excessive dosage of antibiotics are used or not adhere to the recommended dose, then it will cause veterinary drug residues left in animal muscle which able to give effect on human health such as carcinogenic (cancer-causing) and less resistance to body immunity (Marni *et al.*, 2017; Shahdan *et al.*, 2017).

### Broiler Housing Infrastructure

Following on the early history of the broiler's industry in Malaysia started as early of 1960s. The chicken livestock rearing system is generally used free range system on daylight time and when night comes the poultry will be kept overnight. But as the time goes by, with modern technology and the high demand for high-quality chicken meat, this system has changed to an intensive housing system where poultry is provided shelter and other automated facilities (Youn, 2012). The chicken housing system commonly practiced in Malaysia is divided into two types which is open and closed system. (Department of Veterinary Services, 2006). To ensure the broiler are healthy and free from any outbreaks of disease, it is a must that the chicken housing must be cleaned regularly.

To ensure the broiler chicken is in a healthy condition and free from any disease is a must which is broiler house be cleaned up regularly with a proper cleaning schedule. The broiler housing cleaning can be described as a method of cleaning involved the housing facilities such as drink and feed container, a good ventilation system and also cleanliness of farm workers. As Youn

(2012) pointed it out, the activity of broiler housing cleaning commonly performed on a regular basis due to the accumulation of chicken drops, which can cause pathogenic bacteria such as *E.coli*, *Salmonella*, *Listeria monocytogenes* and *Campylobacter* to spread as well as being able to pollute environment and animal feed. In addition, it also causes the respiration process become interrupted and subsequently make broiler chicken suffer from stress symptoms. According to him, if the chicken droppings not be clean it properly will also cause the air environment inside the house will be contaminated with ammonia gas.

### Farm Biosecurity System

In the context of intensive care of poultry practiced by modern farmers is generally required to practice the biosecurity system on organization that manages poultry to obtain a good quality and safe meat. Literally the biosecurity system is more focused on a mitigation measure designed to reduce the risk of spreading the infectious disease to livestock animal (Department of Veterinary Services, 2006; Department of Agriculture, Fisheries and Forestry, Australian Government, 2009; Official Portal of Farmbiosecurity, 2018). In addition, there are also other definitions stated by Maduka *et al.*, (2016) refers to a principle involved in preventing the spread of contagious zoonotic diseases from the source of the intrinsic or extrinsic from farm environment that could potentially infect to livestock.

Generally, there are several aspects of biosecurity systems to be implemented in the poultry rearing farms which to ensure the good health of livestock. Among the requirements is the movement and cleanliness of farm workers be monitored carefully where people are the main vectors of the disease to live broilers. The factors of cleanliness of transportation entering the farms are also taken into account where cleaning and sanitizing are carried out which carrying broiler chickens from farm to slaughter houses. In addition, the farm also must be fully fenced in order not to be entered by other animals such as dogs, cats or wild animals that are capable of spreading pathogenic bacteria or virus to live chicken (Calduch *et al.*, 2013).

Thus, the aspects of poultry management are carried out to prevent any spreading and virus infected to the flocks. These include the isolation of broiler chicken between healthy and diseased chickens in a cage and also the dead chicken's disposal method is carried out in an appropriate manner to control infection through soil, water and air. According to Calduch *et al.*, (2013) suggested the best method disposed dead chickens is by using incineration method or buried in soil. He added that if a live chicken is infected, it must be slaughtered immediately so that it does not become infection vectors to other chickens. Besides that, the biosecurity factor such as infrastructure cleanliness of broiler housing is also taken into consideration. This refers to the cleaning and disinfection of broiler housing, poultry wastes disposal, performing the process of disinfecting the floor and wall as well as feed and drink containers. Another aspect of farm biosecurity is the operation of a pest control system which refers to the installation of nets and rodent traps to prevent pests from entering inside the broiler house.

### Logistic

Logistics activities are generally known as considered one of the most important activities which involve delivering the chickens to slaughter houses. In the context of logistics it is also categorized as one of the halal control points and it covers an animal welfare aspects of livestock. Based on portal of Department of Veterinary Services Malaysia (2015), describes the definition of animal welfare refers to an animal can adapt to environmental conditions such as in a healthy, comfortable, supplied with adequate food and nutrition, safe from any kind of threat and the situation not to suffer any pain, pain and stress.

According Shahdan *et al.*, (2017), states there is less awareness of animal welfare on Malaysian community compare with



western countries that have strong support and have great awareness on animal welfare. According to his opinion, animal welfare are related with free of pain, hunger and thirst, freedom from fear and distress of the animal. Livestock animal should be treated nicely especially where animals must have opportunity to enjoy the good life. A good animal welfare levels are also linked to the control of diseases and supplying a good veterinary medical care, feed management and given a good humane treatment to animals.

According to Islamic perspectives, animal welfare are refer to animals being raised must be not hunger and thirst, the animals feel comfortable stay in the cage, not suffer any pain, injury or disease. This concept has actually been practiced by halal slaughtering industry as well as traditional slaughtering (Suhaimi, 2005). Therefore this aspect of this logistic component that be carried out at broiler farming activities is involving from delivery activity of chicken to slaughter house or other market places. If the logistic activity not following a proper procedures this will result stress disorder to the broiler chicken during delivery process by lorry and this will effect to the quality of meat products. (Shahdan *et al.*, 2016). Therefore, according to Koknaroglu & Akural (2013) stated that during catching process be done by farmers, the chicken will be inserted into small cages with 4 to 6 nos of chicken. With this practice, it's able to reduce stress disorder during transportation. The conditions of transport used are also taken into consideration as a factor on animal welfare that must have a good air ventilation to reduce stress on the chicken during transportation. Once the chicken has reached its destination it must be kept rest on certain time before it is be slaughtered. This is due to reduce heat stress on chicken that can cause low quality of poultry meat produced (Koknaroglu & accrual, 2013; Shahdan *et al.*, 2016).

Based on the above explanation, the animal welfare aspect on logistic activity is considered an important component because from an Islamic perspective, the mistreatment and handling of animals with inhumanity is prohibited in Shariah law. In addition, chickens before slaughtering should also practice animal welfare ethics and give a good humane treatment on animals. As conclusion on this element of logistic especially starting from broiler chicken farm be transfered to slaughter house is suggested as a point of control in HAS management at the poultry farm.

#### CONCLUSION AND RECOMMENDATION

One of the main goals and objectives of the establishment of the HAS is to further enhance the integrity of the halal products produced following the concept of 'From farm to consumer' which involves the level of raw material supply to the end user. In the implementation of this system HAS in Malaysia is only discussed at the stage of receiving raw materials to finished products and subsequently consumed by consumers. As such, HAS implementation practices are less emphasized and are not implemented at the top halal food chain level involving the broiler industry.

All of the elements that have been discussed in this paper is an important aspect to produce broiler chickens that meet halal concept *thoyibban* and legislation. In addition, this article also indirectly complement the halal assurance that starting from the farm to the consumer. After discussions made by the author related to elements HRC involved, the authors believe that further studies need to be done in detail to evaluate the method of determining the halal control and develop a plan of risk analysis lawful on farms broiler by the combination of resources Quran and hadiths and food safety quality systems. Therefore, this study found that the development of HAS at the breeding level will have a positive effect on maintaining the level of integrity as well as producing poultry meat which is halal and safe for consumers especially the Muslim community.

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