Review Article

Halal Meat Fraud and Safety Issues in Malaysian and Indonesian Market

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ABSTRACT

In recent years, there is a drastic cognisance in meat related issues for both consumers and researchers. Consumers are concerned about the meat they eat because it is a main daily source of protein. For Muslim consumers, halal and safety aspects of meat products are also of pivotal focus. Clearly, meat fraud activities such as meat adulteration, substitution, stolen livestock, grey market products, smuggling, misrepresentation and mislabelling; are against the halalan toyibban principle. Perpetrators, particularly in Malaysian and Indonesian meat industry use harmful and unsafe materials in fraudulent meat products such as *glonggong*, formalin, *tiren*, fake meat, exotic meat, aniline and garbage meat. This paper also discusses in brief a new breed of terrorism that poses a threat to the food chain, coined as food terrorism. Various fraudulent actions can threaten the lives of humans, animals and other food sources contradictory to Shariah guidance. Therefore, all parties need to mobilise a regional and global collaboration in combating food perpetrators and terrorists in ensuring that meat products in the market fit the halalan toyyiban criteria.

Keywords*:* Food safety; Food fraud; Halalan toyyiban; Meat; Halal ecosystem

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Introduction

Meat is one of the best nutritional sources of protein for human consumption, and due to its valued flavour and taste, it is primarily consumed throughout the world (Rahmati et al., 2016). In the past three decades, due to rapid economic and population growth, total meat production in Asian countries has radically increased. From 1985 to 2014, meat production increased by 252.47%, from 38.5 to 135.7 Mt. In the last 10 years, the amount of beef, mutton, chicken, duck, and goose have increased by 27.25%, 18.92%, 52.73%, 33.21%, and 27.18% respectively (Zhang et al., 2017). As such, the global meat demand is expected to have doubled by the year 2050 (FAO, 2009). Most of the growth in meat demand comes from developing countries (Bekker et al., 2017).

Recently, there has been a growing public awareness on food safety issues related to meat products, such as illegal production of water-injected meat, fake beef and lamb, rotten meat, and toxic meat products (Liu et al., 2016). Besides the safety issues, there are also halal-related issues such as halal meat mixed with haram (illegal) meat, carcass, substitution of beef with pork meat, and mutton with dog meat.

Based on media reports, there has been an expansion in food-related criminal action since the economic crisis of 2007 to 2008 – including sheep robbery, exchanging of illicit halal meat, and contamination or mislabelling of food products (McElwee et al., 2017). Manning et al. (2016) reported that, the United Kingdom (UK) Foot and Mouth Disease (FMD) outbreak in 2001 was probably connected to illegally imported meat, illegal movements of sheep as well was spreading of disease with criminal intent and criminal compensation claims.

In this regard, the study will scrutinise a basic guidance on halal meat and elaborate more on halal meat fraud and safety issues in Malaysian and Indonesian markets.

Basic Guidance on Halal Meat

Halal is defined as lawful or permissible to use or to engage in, according to the Quran and Sunnah (Al-Qaradawi, 1980). Meanwhile, meat is the edible flesh of livestock, poultry or other animals. Halal meat can also be defined as meat derived from slaughtered livestock animals and poultry in accordance with the Shariah (Qureshi et al., 2012; Hamdan et al., 2017). Every Muslim consumer should consider to opt for halal meat in their daily diet as this will influence their level of health, emotional stability and spiritual equilibrium.

Based on the Quran, Muslims are obligated to eat only the meat of halal animals upon which Allah's name has been invoked (invocation during slaughtering of the animal).

"Therefore, eat of that upon which Allah's name has been mentioned if you are believers in His communications," (Al-Quran, Surah Al-An'am (6): 118).

Halal meat must not come from the prohibited meat as mentioned in the Quran, surah Al-Maidah (5) 3:

> "Forbidden to you is that which *dies of itself*, *blood*, and *flesh of swine*, and that on which any other name than that of Allah has been invoked, and the strangled (animals) and beaten to death, and that killed by a fall and that killed by being smitten with the horn, and that which wild beasts have eaten, except what you slaughter before, and what is sacrificed on stones set up (for idols); and that you divide by the arrows, that is transgression.
> This day, those who disbelieved have despaired of your religion, so fear them not, and fear Me. This day, I have perfected for you your religion and completed My favour on you and chosen for you Islam as the religion, but whoever is compelled by hunger, not inclining wilfully to sin, then surely Allah is Forgiving, Merciful.

Therefore, the origins of halal meat are strictly from halal sources only. All land animals are halal except for pigs, dogs, and carnivorous predatory animals that slash and kill such as tigers, lions, bears, cats and similar animals; animals with tusks such as elephants; and permissibly-exterminated animals in Islam such as rats, centipedes, scorpions and other similar animals. Equally, all birds are halal except for scavengers and birds of prey, that are those with claws and feed by snatching and tearing like eagles; and also forbidden-to-be-killed birds in Islam such as woodpeckers (Department of Standard, Malaysia, 2009). In attaining the halal meat status, halal species of animals must be slaughtered using a halal slaughtering method (Nakyinsige et al., 2012).

Hence, based on the Shariah guidance highlighted above, it can be concluded that the halal meat must fit these criteria, namely:

1. Must not contain pork and its derivatives.
2. Must not be derived from carcasses and non-slaughtered farm animals.
3. Must not be derived from prohibited animals.
4. Must not be derived from blood.
5. Must not be derived from meat partly cut-off from a living animal.
6. Must not be harmful to health.
7. Must not contain elements of fraud.
8. Must not contain intoxicating substances.

Halal Meat Fraud and Safety Issues

According to Hargin (1996), adulteration is defined as the addition of undeclared substances or materials to increase bulk product or weight, making the product appear more valuable than it is. In the case of meat, adulteration not only refers to the replacement of ingredients but also to incorrect information concerning the origin of raw materials (Montowska & Pospiech, 2014). Meat adulteration can take many forms, and there are many points of vulnerability due to complex supply chains (Black et al., 2016).

Spink and Moyer (2011) proposed seven types of food fraud: adulteration, counterfeit product, diversion of products outside of the intended markets, over-run, simulation, tampering and theft. In specific fraudulent issues related to a meat product, Ballin (2010) explains that meat adulteration, where fraud is most likely to happen, is structured into four main areas: 1) meat origin (sex, meat cuts, breed, feed intake, slaughter age, wild vs farmed

meat and geographic origin); 2) meat substitution (species, tissue); 3) meat processing or treatment (fresh vs thawed, meat preparation); and 4) non-meat ingredient additions (water and additives). Collectively, food fraud encompasses the deliberate and intentional substitution, addition, tampering, or misrepresentation of food, food ingredients, or food packaging; or false or misleading statements made about a product for economic gain (Charlebois et al., 2016).

In global issues, the food crisis triggered in 2013 by beef substitution with horse meat in the lasagna produced by Comigel and marketed by Findus, led to the checking of other meat products marketed on the European market (Stanciu, 2015). In January 2013, the Food Safety Authority of Ireland announced the discovery of horse meat in a number of beef burgers, heralding a Pan-European meat authenticity crisis. In the UK, a critical investigation by the Food Standards Agency (FSA) found several beef products that contained horsemeat, resulting in the large-scale removal of products from supermarket shelves (Jakesa et al., 2015). Additionally, a test done by the British food industry on 2501 samples of beef pasta for horse adulteration revealed more than 1% of horsemeat merged with beef (Castle, 2013).

Meanwhile, issues related to meat in Malaysian and Indonesian markets are mostly reported in mass media especially newspapers, and website, but scientific research related to these issues are very scarce in number. Some meat issues that have arisen in Malaysian and Indonesion markets described below.

Formalin in Meat

Formaldehyde is a chemical commonly used in industry for the manufacturing of plastic resins used in wood, paper and textile industry. Formalin, which is a solution of about 37% formaldehyde, serves as a disinfectant and preservative for household products (Arthur, 2007). Some industry players use formalin to maintain and preserve a meat texture and colour (Sulistyo & Fikri, 2014; liputan6.com, 2017). This chemical is very hazardous to human health because it can cause cancer and leukaemia (Ahmad, 2010).

"*Glonggong*" meat

In the Indonesian language, *glonggong* literally means a water injection into the body of a cow or chicken either directly into the meat or inserted through the mouth of the animals. Water-injected beef has aroused public concern as it is a major food-safety issue in meat products. Cows were forced to drink as much water as possible before they are slaughtered resulting in weight gain. However, the quality of the meat decreases because the meat decays easier and prone to contamination by microbes. Forcing of water entry into these animals can cause faintness or death (Layla, 2013). The animal's welfare is unattended, and there is an element of fraud against consumers because of poor quality meat (Sulistyo & Fikri, 2014). The animals, even before the slaughtering takes place, may turn into carcasses due to death by forced water entry to the lungs and also from stomach rupture (Prasetyo et al., 2009).

Tiren

In the Indonesian language, the words *ayam tiren,* a short form of *mati kemaren*, literally means "chicken that has already died yesterday." Therefore, *tiren* refers to a dead chicken and has become a carcass due to illness or other causes (Layla, 2013). This *tiren* chicken is sold at a lower price compared to fresh chicken. *Tiren* chicken is commonly abused by street hawkers to make food-based products such as meatballs and satay. However, since it can be easily contaminated with harmful bacteria, consumers are exposed to the risk of food poisoning (liputan6.com, 2017).

Fake Meat

Fake meat refers to a substitution of physical characteristics, its textures and taste to take the form of fresh meat. Perpetrators use a type of chemical that can eradicate the physical attributes, texture and taste as well as the odour of fake meat while mimicking fresh meat. In Indonesia, meat sellers have substituted beef with wild boar meat by adding a little colouring or soaking the meat in cow's blood to give similar look and smell like beef meat (Sulistyo & Fikri, 2014).

Exotic Meat

The exotic meat from wild animal species, from terrestrial mammals to birds and reptiles, is mostly referred to as bush or game meat (Sandalj et al., 2016). Beyond its nutritional contribution, since it is easily traded, bush meat also provides a significant but illegal source of income. Furthermore, bushmeat is often favoured for consumption because it is familiar, traditional or since it confers social prestige, while in many (but not all) cases it may be preferred for its taste (Cawthorn & Hoffman, 2015). Due to its usage in alternative medicine and tradition, the demand for wildlife meat has increased significantly. For example, meat from protected wild animals such as wild elks, venison, deer and pythons are sold illegally but publicly in Beriman Tomohon market, Indonesia (Beritanusantara.id, 2017). Despite its nutritional contributions, there are also some serious health concerns associated with the consumption of bushmeat. Up to 75% of emerging infectious diseases in humans are of zoonotic (animal) origin, most of which originate in wildlife. The hunting and butchering of bushmeat, particularly primates, have been implicated in the transmission of several zoonotic pathogens to humans, including simian immunodeficiency virus (SIV, a zoonotic form of HIV), Ebola, severe acute respiratory syndrome (SARS), monkeypox, simian T-lymphotropic virus and simian foamy virus (Cawthorn & Hoffman, 2015).

Meat Containing Foodborne Zoonotic Diseases

Foodborne diseases are a significant cause of morbidity and mortality, and a significant impediment to socio-economic development worldwide, but the full extent and burden of unsafe food, and especially the burden arising from chemical and parasitic contaminants, has been unknown (WHO, 2015). Zoonotic threats can be transmitted directly or indirectly between animals and humans, for instance, by consuming contaminated foods or through contact with infected animals.

World Health Organization (WHO) (2015) reported 420–960 million foodborne illnesses and 310,000 to 600,000 deaths in 2010 representing 25–46 million Disability Adjusted Life Years (DALYs); among the culprits, namely *Salmonella typhi* and non-typhoidal *Salmonella enterica*, Campylobacter spp. *Taenia solium,* enteropathogenic *Escherichia coli*, hepatitis A virus, norovirus and aflatoxin (Saucier, 2016).

While horsemeat is considered as an excellent dietetic alternative for red meat; however, it has been responsible for 16% of human trichinellosis outbreaks. Between 1975 and 2005, 15 horsemeat-related outbreaks of trichinellosis involving at least 3200 people occurred in France and Italy, two countries with the largest per capita consumption of horsemeat. Curiously, the regions in Italy where these outbreaks occurred were historically interested by the French domination which probably has introduced the habit of consuming raw horsemeat (Rostami et al., 2017).

There are other cases related with the zoonotic Sarcocystis species in pork, *Sarcocystis suihominis*, with domestic and wild pigs as intermediate hosts. Two zoonotic species are present in cattle, *Sarcocystis hominis*, and *Sarcocystis heydorni*; though neither species has been recognised in North America. Although isolated human cases of muscular sarcocystosis have been known for more than 100 years, recently this mysterious and diagnostically challenging illness has been reported in humans on vacation or travelling to Malaysia (Dubey, 2015).

Also, MERS-CoV is a zoonotic virus, which means it is a virus that can cross-transmit between animals and people. Studies have shown that humans are infected through direct or indirect contact with infected dromedary camels. MERS-CoV has been identified in dromedaries in several countries, including Egypt, Oman, Qatar, and Saudi Arabia (WHO, 2017). The MERS-CoV mechanism of transmission is still being debated, but it is presumed to involve direct interaction with the mucus secretion (saliva) of diseased camels or via the milk intake or perhaps the uncooked meat (Mahallawi, 2017).

Likewise, the consumption of meat from an animal which is affected by the mad cow disease, also known as Bovine Spongiform Encephalopathy (BSE), will increase the risk of Creutzfeldt-Jakob's disease (vCJD). This disease can cause shrinkage of the human brain (Roslan & Abdul Manaf, 2014).

In Malaysia, many food poisoning cases reported are related to *salmonella,* which can cause diarrhoea, fever and abdominal cramps (Ministry of Health, 2014; Kosmo Online, 2013). Therefore, the safety of food chain is threatened by existing and emerging pathogens including the foodborne pathogens and zoonotic infections (Fitzpatrick, 2013).

Mislabelled Meat

Recently, increased awareness among consumers in getting correct information and their demand for transparency has sparked public scrutiny on mislabelling and malpractices in food chain (Chuah, 2016). While regulations enshrined in national and international law

underpin mandatory label information (Ballin, 2010), additional descriptive label information are given to complement branding and for product marketing purposes.

Meanwhile, the substitution of buffalo meat with raw and processed beef meat in Malaysia is most probably due to economic motivation. Thus, products labelled as beef without specifying the meat sources as of buffalo–or cattle-origin will be regarded as mislabelled. The study conducted in the Malaysian market on beef and poultry labelling found that only 21.7% of the labelled meat was appropriately done and 78.3% was not accurate. From 40 of the 50 samples labelled as beef cattle taken in the market were of buffalo DNA (Chuah et al., 2016). Also, on August 8, 2013, the Kosmo newspaper reported that deer meat is also replaced with buffalo meat. The prices sold are so low while the market price for deer meat is at least RM50 for 1kg (Kosmo Online, 2013).

In line with this context, the truthful and accurate food labelling is essential to assure consumers rights to informed choice and food safety. In meat products, there is a requirement to indicate the amount of each ingredient contained in them. The declaration establishes a new definition of meat with the purpose of accurate product labelling (Sentandreu & Sentandreu, 2014).

Aniline Meat

The *Ayam Kampong* (in Malay language) or "free-range chicken" soaked in a kind of dye that is known as aniline disguising the chicken flesh with a yellowish colour to mimic the real *ayam kampong*. For example, The Star newspaper reported on September 24, 2013, the existence of fake chicken in which the skin was dyed yellow to impersonate the real *ayam kampong*. This yellow dye used to dip chickens is widely used in the wood and leather industry (The Star, 2013)

Garbage Meat

Garbage meat refers to the meat collected and scavenged from garbage sites and dumps. Garbage scavengers, also known as trash mongers or garbage diggers, find treasures from recycling other people's trash, especially from food restaurant. The collected meat will be reprocessed by washing in addition to mixing dyes and formalin to remove odours and add in flavours (Bagus, 2013; liputan6.com, 2008). Some of this meat will be recycled as meatballs (Layla, 2013). In the Philippines, it is called as *pagpag* or *terter*, (Tagalog term for leftover food from restaurants scavenged, from garbage sites and dumps) (Diamante, n.d.).

Based on the above discussion, there are various issues related to meat products either in the form of raw or processed meat. These fraudulent activities can lead to harmful effects to the consumers. As such, the incorporation and practice of halalan toyyiban in meat industry is seen to be able to ensure halal and safe meat produce.

Food Terrorism: New Threat in Halal Market

Recently, the act of terrorism has rapidly overgrown in line with the sophistication of technology achieved by humans. It has evolved from traditional approaches and developed

into new forms, such as cyberterrorism, bioterrorism, and food terrorism. Food terrorism has been defined by the World Health Organization (WHO) as "an act or threat of deliberate contamination of food for human consumption with chemical, biological, or radio-nuclear agents for the purpose of causing injury or death to civilian populations and/or disrupting social, economic, or political stability" (Ereifej, 2011). In other words, it refers to the deliberate contamination of some component in the food supply with the intention of doing physical or economic harm or invoking fear (terror). Food is one of the several vectors used to induce intense prolonged fear with imagined or real future dangers and has been used around the world (Kinsey et al., 2009).

Food terrorism involves attacks on food sources, especially agriculture either in the form of agroterrorism or bioterrorism. Different targets of food terrorism attacks in the farm-to-table food continuum include crops, livestock, food products in the processing and distribution chain, wholesale and retail facilities, storage facilities, transportation, food and agriculture. Agricultural sectors of all nations are vulnerable to terrorist threats and attacks. Intentional introduction of toxic or nontoxic additives at various stages in the agricultural infrastructure that provides a population with its food supply could adversely affect either plants or animals. The effects can be severe illnesses and death, and substantial economic losses, both direct and indirect (Rohn & Erez, 2013).

The Counter Agro Terrorism Research Center (CATRC) (2010) defines agroterrorism as "a hostile attack, towards an agricultural environment, including infrastructures and processes, in order to significantly damage national and international political interests." The reasons for agroterrorism are the desire to alter supply or demand conditions for a commodity to cause severe economic hardship for their political adversaries (Caldasa & Perz, 2013).

The analysis by Carus (2001) on the use of biological agents since 1900-1999, found only four catastrophes of terrorism definitely involved, namely Aum Shinrikto (1990-1995), which used *Bacillus anthracis* agents, Botulinum toxin, and other pathogens, Rajneeshees (1984) which used *Salmonella* typhimurium agent, *Dark Harvest* (1981) which used *Bacillus anthracis* agents and *Mau Mau* (1950) which used a toxin, African milk bush (*Synadenium grantii*).

However, the tragedy of September 11, 2001, has given rise to a heightened awareness on the potential terrorist attack of a biological or chemical nature targeting the U.S. food supply, including agriculture. The threat of terrorism on the food supply is real, and because of the vast economic, health and social welfare costs associated with food contamination, it is believed that the food supply presents a tempting target for terrorists who want to destabilise the economy (Turvey et al., 2010). Such fears have escalated globally since the September 11 attacks, and subsequent anthrax attacks one month later (White, 2009).

However, according to Stephen (2003), the most challenging issue about bioterrorism is that its possibilities exist in water, land, food, air, and the human being itself. Biological agents for bio-terroristic attacks are readily available, are relatively inexpensive to produce, store, and transport from one country to another. They can be used to terrorise defenceless civilians by contaminating food supply with potential biological agents such as bacteria, rickettsia, viruses or their toxins, or toxic chemical agents such as metals, cyanide, nerve agents or

industrial chemicals and pesticides (Ereifej, 2011). Specific characteristics will make some biological agents more attractive than others, such as transmissible through ingestion, chemical stability, and market availability. Other factors include; agents that are more readily available are likely to be used by bioterrorists, limited technical expertise and equipment required to propagate or amplify, highly pathogenic/low infectious dose in food, high mortality, difficult to detect in food, potential for mass fear, difficult to diagnose in humans, and potential for human-to-human transmission (Hansen, 2010).

At the beginning of 1936, the Japanese army ran a top-secret BW facility in occupied Manchuria known as Unit 731, where military scientists cultivated deadly bacteria and tested them on prisoners of war. Japanese military aircraft dropped ceramic bombs containing plague-infested peas and grain (to attract disease-spreading rats) on eleven Chinese cities in 1940, triggering deadly epidemics (Tucker, 2002). In 2003 there was the "beer and burger plot"; an al-Qaeda terrorist plotting a bomb attack in Britain told an accomplice to get a job at a stadium and sell contaminated beer at soccer games. In 2008 in Iraq, thallium (thallium sulphate probably) an odourless, and tasteless chemical occasionally used in insecticides and rat poison was put into a cake that was delivered to a sports club by a sports coach who had left the club on bad terms. As a result of this poisoning, two children died, and five people were seriously ill. On September 12, 2008, there were reports, from China of melamine-contaminated infant formula. According to media reports, more than 54,000 infants and young children have sought treatment for urinary problems, possible renal tube blockages and possible kidney stones related to the melamine contamination of infant formula and related dairy products (Tucker, 2002).

Along the lines of bioterrorism attacks, BSE has been found in more than 187,000 animals in approximately two dozen countries. However, the majority of cases, approximately 183,000, have been in the United Kingdom (UK), where the disease was first detected in 1986. BSE is thought to be transmissible to humans who eat contaminated beef, causing a variant form of CJD (variant or vCJD) that was first recognised in 1996 during the BSE outbreak in the UK. Almost 200 people have been diagnosed with vCJD since 1986, most of them in the UK. As of mid-May 2007, no persons were reported to have contracted vCJD in the United States (Lister & Becker, 2009).

In particular, health threats including infectious diseases, natural and human-made disasters and environmental change impact human populations worldwide, but they are especially challenging for vulnerable populations in many of the developing nations of Southeast Asia (Campbell, 2012). Food and water-borne diseases caused by *Escherichia coli*, *Clostridium botulinum*, *Vibrio* spp., *Salmonella* spp., and other microbial pathogens are responsible for more than 600,000 deaths in Southeast Asia each year (WHO 2008). Additionally, an outbreak of Nipah virus in Malaysia occurred when pigs penned near fruit orchards contracted the virus from bat droppings, whose habitat had shifted as a result of deforestation. The infected pigs then readily transmitted the virus to their handlers. In addition, as mentioned by Solodoukhina (2011), in the last few years several new diseases were detected such as severe acute respiratory syndrome (SARS), monkeypox, and avian influenza.
Consequently, the threat of food terrorism is considered as an invisible enemy. The specific counter measures to minimise or eliminate vulnerabilities should be taken to protect the food supply and chain from deliberate contamination that is intentionally meant to harm

individuals or organisations (Batt, 2016). The failure to develop a food defence and protection will lead to catastrophe in the food chain in which includes the supply of livestock and crops, sluggish economy and will directly affect human survival.

Conclusion

Islam strongly emphasises the aspect of halalan toyyiban of food consumption among its followers. The food intake of meat consumption by a Muslim must be gained clearly from halal animals that have been slaughtered based on Islamic practices, other than free from contamination of harmful elements (Muhammad Ikhlas et al., 2014). Therefore, based on the issues that are arising in halal meat production, all parties whether the government, halal authorities and even Muslim consumers, especially in the Southeast Asian region, should strengthen regional collaboration in developing the halal industry by empowering and preserving regional halal ecosystems. This collaboration is critical for constructing a regional food defence system as well as safeguarding its safety and security, mainly concerning with meat products. With this collaboration, criminal activities related to meat and food terrorism can be managed efficiently.

Conflict of Interest

The author declare no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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