Sanitary conditions in mauritius slaughter houses

Experience, Laughter

INTRODUCTION

A slaughterhouse, also known as an “ abattoir” is a place where animals are sacrificed for food. It can also be defined as any premises used for the slaughter of animals whose meat is intended for human consumption. The slaughtering of animals for community consumption is inevitable in most nations of the world and dated back to the ancient times (Bello and Oyedemi, 2009). Public slaughter houses had been traced to Roman civilization and in France by 15th and 16th centuries, and were among the public facilities. In Italy, a law from 1890 stipulated that public abattoir should be provided in all communities comprisingof more than six thousand inhabitants. Similar things were reported in Norway, Sweden, Denmark, Netherlands and Rumania (Jode Loverdo et al. 1906). The animals most commonly killed for food are cattle, sheep (for goat and mutton), pigs (for pork), goats (for chevon), and fowl, largely chickens, turkeys, and ducks, for poultry meat.

The most important issue in all meat-processing plants is maintenance of proper hygiene and adequate sanitary conditions to prevent contamination and in this way caters for a product which is safe and sound for the public. An abattoir as defined above is a building approved and registered by the controlling authority for hygienic slaughtering and inspection of animals, processing and effective preservation and storage of meat products for human consumption (Alonge, 1991), as such the sanitation line in a slaughter house must be flawless.

Slaughtering animals on a large scale brings about significant technical problems and public health concerns. Furthermore, some religions insist on certain specific conditions for slaughtering practices so that slaughter within slaughter houses may change. As such abattoirs commence the chain of the meat industry, where livestock come from farms for processing and dressing and passes through markets to enter the food chain (Wikipedia Encyclopedia).

The values, morals, ethics and regulations ruling slaughter houses changes significantly throughout the world. In several countries the slaughter of animals is delimited by folklore and traditions instead of the law. In the non-Western world, including Muslim countries both forms of meat are obtainable, that is product from modern mechanized slaughter houses, and the other from local meat shops.

The situation in Mauritius is typically representative of the conflict between modern processes and religious practices with regards to the slaughtering of animals for the supply of meat to the population. Over the last few decades there have been important developments meat inspection systems in slaughter houses. As compared to the most highly developed countries which have taken the lead in bringing about changes in the meat inspection procedures in slaughterhouses by enacting new legislations (These new laws have been reproduced by the Codex Alimentarius in its Codes of Good Practice and this resulted in the homogenization of the world trade in foodstuffs) (Schnöller, 2006), we, on the national level, are dealing with a more pious look over the slaughtering industry which is delimited by

religious practices. As per the legislation enforced in Mauritius, the Mauritius Meat Authority is the only institution empowered to deal with the slaughtering of animals.

Aim

The aim of the study is to carry out an assessment on the sanitary conditions prevailing in slaughter houses in Mauritius.

Objectives

The main purpose of this survey is to know to what extent are the workmen of slaughter houses aware of importance of sanitary practices and what it entails, to see if sanitary practices are respected and analyse the possible route by which contamination by pathogenic micro organisms may occur in slaughter houses.

LITERATURE REVIEW

Sanitation in the slaughter house

Thewordsanitationcomesfromthelatinwordsanitas, whichmeans" health", it has many different meanings but it can be generally defined as the hygienic means of promoting health through prevention of human contact with the hazards of wastes. Such hazards can be physical, microbiological, biological or chemical agents of disease (Wikipedia Encyclopedia).

The slaughter house should be constructed in such a way as to respect all the norms and regulations and planned such that all processes runs smoothly without contaminating or hindering the quality of the end product.

Primarily there are several key factors that a slaughter house should observe to be able to satisfy the necessary conditions which will contribute to adequate sanitation for the prevention of contamination.

PROPER INFRASTRUCTURES AND PLANNING OF THE SLAUGHTER HOUSE

Site of building

Ideally the slaughterhouse should be located away from residential areas to prevent possible inconvenience to dwelling-places either by way of pollution from slaughter wastes or by way of nuisance from noise (FAO Animal Production and Health Paper – 49). There must be free access for animals to the site by road and the slaughterhouse should be situated in areas where flooding is unlikely to happen. If the slaughterhouse is of regular buildings construction the ground should be free of bushes or vegetation in the vicinity of the structure (FAO, 1985).

Size

The amount of animals to be slaughtered should take into account the the size of slaughter facility and the number of animals to be slaughtered is of great importance to avoid sanitary problems due to overcrowding (Tove, 1985).

Building / facility

The building or facility of such process has normally been described as places which stands for good sanitation and hygiene. According to the norms stipulating such process the building should normally have clean and unclean processes separated.

Walls and Floors

The flooring of the facility which is one of the major source of contamination must be hard, free of cracks, evenly leveld and impervious, and sloping adequately towards a drain to allow cleaning with water and disinfection. The walls as well must be smooth enough to be easily cleaned by water, and recommended materials are, for instance, stone, lava blocks, bricks or concrete. To provide shade, a good environment and finally to keep down the internal temperature in the slaughter line, a roof made up of concrete would be ideal (P. J. Eriksen, 1978).

lighting system

As a matter of hygiene, the slaughterhouse should have a proper lighting system inside the slaughter line to allow proper functioning and avoid accidents and moreover will act as a deterrent to insects and rodents.

Ventilation system

The internal temperature inside the slaughter house shall be maintained to prevent proliferation of unwanted micro organisms and also to cater for a good working environment.

Equipment

Equipment for undergoing such process, normally have to follow certain norm and regulation, it has been reported that such equipments have to be of non-corrosive materials, for example stainless steel and structures like tables, hooks and machines should be that they are easy to disassemble to facilitate cleaning and disinfection. The key step for the hygienic handling of

carcasses is the equipment for elevating the carcass when slaughtered. In the processing line cranes are preferred to working tables due to hygienic practices. Procedures assuring continuous cleaning of hoists are recommended and should be performed on a periodical basis. However the cleaning and disinfection is usually complicated or simply impossible because of the complexity of the machines (Tove, 1985).

Water supply

Water is a vehicle for the transmission of several agents of disease and continues to cause significant outbreaks of disease in developed and developing countries (Kirby, 2003).

- A cholera epidemic in Jerusalem in 1970 was traced back to the consumption of salad vegetables which were irrigated with raw waste water (Shuval, 1986).
- In Canada, an outbreak of E. coli was reported (Kondro, 2000) and
- In the USA, Cryptosporidium affected approximately 400, 000 consumers and caused 45 deaths and in 1993 due to the consumption of contaminated water (Kramer, 1996, Hoxie, 1997).

Since slaughtering is a process which generates a lot of wastes, to cater for the good running of the processes and minimize contamination, there should be a good supply of water of drinking quality to allow processing and cleaning procedures which will assure hygienic quality products. Working routines should be planned in such a way as to economically use the consumption of water because of waste water disposal (Tove, 1985).

Sanitary facilities

Several water points, sterilizers for hand tools, hoses and cleaning equipment is the key to provide a good standard of hygiene and must be provided sufficiently. The availability of hot water in preference to chemical disinfectants should be supplied with the sterilizers where possible (Tove, 1985).

Sanitary facilities must also include an adequate number of toilets and arrangements for hand-washing and even for bathing (showering). Such facilities must be clean and well kept at all times and the toilets should possess hand wash basins along with soap, disinfectants, antiseptics, nailbrushes and clean towels readily available. A mess room for resting and eating should be provided to the staff and as such be separated from the processing line to assure that the carcasses and the food for the personnel cannot be mixed (FAO animal production and health paper; 53).

ENVIRONMENTAL HYGIENE

As in all sectors of hygiene, the external and internal environment of the slaughter house should be protected against any infestation. Insects, birds and rodents have been recognized as important carriers of pathogens and other micro organisms (Olsen and Hammack, 2000). To avoid these, a strict control should be exerted over the following:

Pests Control

Good Hygienic Practices (GMP) should be employed to avoid generating an environment favorable to pests (CAC, 1997). A control system for pest control must include the following:

- Good Hygienic Practices should be used to avoid creating an environment conducive to pests
- Pest control programs could include preventing access to principle site, eliminating harbourage and establishing monitoring detection and eradication systems.
- Physical, chemical and biological agents should be properly applied by suitably qualified personnel.

Souce: http://www. fao. org/docrep/005/Y1579E/y1579e02. htm

Proper fencing

The aim is to prevent access of unauthorized persons, the public in general, dogs and other animals around the slaughterhouse premises. The fencing should have direct contact with the ground and should be sufficiently high to prevent access inside the premises.

Bird control

The best control is to prevent them from accessing the buildings by placing nets on the openings and windows. Allowing birds to fly inside the slaughter house might cause contamination through its droppings. Bird are often attracted by food supplies, water, special vegetation around buildings, and these attractants should be removed.

SLAUGHTERING PROCESSING

The hallmark for hygiene principle in processing is that the procedures considered as clean and considered as unclean should be efficiently separated. This requires a well-structured plant layout, where the purpose of

any structure should be the protection of the end product against accidental contamination (Tove, 1985).

Transport

The animals are hauled from pastures or farms to the slaughterhouse. All necessary precautions during transportation should be considered to minimize stress and injury to the animals and as such will cater for the good quality of the end product (Tove, 1985). Road transport is probably the cheaper and more convenient means for conveying animals. Below are some precautions that are worthwhile during road transporting of the animals to slaughter:

1. The transport facility should be designed and modified to convey the stock;
2. they should provide for sufficient ventilation and lighting;
3. for open trucks the top should be covered with a tarpaulin to protect the animals from bad weather conditions,
4. they should be equipped with appropriate loading and unloading mechanisms to prevent injuries, and most importantly;
5. they should be as comfortable as possible for the animals.

Source: FAO Animal Production and Health Paper – 49, Manual for the slaughter of small ruminants in developing countries, 1985.

Lairage

Lairage is a place where livestock are kept temporarily (Microsoft Encarta 2008) and in our present situation is a specific area inside the premises of a

slaughter house where the animals are conveyed for rest. Rest is an important factor because when animals are stressed, carcasses of lower quality result from slaughter. There should be sufficient space for the animals and a good supply of potable water for drinking purposes. A washing system where the animals can be cleaned before passing to the slaughter house is generally recommended (FAO animal production and health paper; 53).

Source: Heinz G, Abattoir development. Options and designs for hygienic basic and medium-sized abattoirs, 2009 (http://www. fao. org, Annex 7).

Stunning, slaughtering and bleeding

Common methods for stunning consists of:

Captive Bolt Pistol (CBP)

- This stunning method is extensively used for all agrarian animals. Gun powder (cartridge), compressed air and spring under tension propels the bolt through the skull of animals. The name ‘ captive’ means that the bolt is shot out of the barrel but remains in the pistol.
- Concussion stunning: A mechanically operated instrument which delivers a blow to the brain. Used for cattle, sheep and calves. Another method which consisted of knocking or striking a hammer on the head of the animal is now banned with regards to humane practices in some countries.
- Free bullets: are generally used on animals which are difficult to handle for instance, wild pigs, bison and deer.

Electric Stunning

- Head-Only Stunning: generally cattle, sheep, pork and are all stunned by the use of this method. The technique involves the application an electric shock using a pair of tongs on either side of the animal's head. An electric current is passed through the brain and this leads to the temporary loss of consciousness.

Source: The Slaughter of Livestock (part 2): Modern Techniques of Slaughtering by M. Abdulsalam (www. IslamReligion. com).

Slaughtering and Bleeding

After stunning, the animal is vertically hanged lifting the animal (head down) to a convenient height. The bleeding operation is made by inserting a knife through the neck behind the jaw bone and below the first neck bone. The aim is to sever the carotid artery and jugular vein (Pig slaughtering, www. Hyfoma. com) and let the blood to drain out. The exsanguination process should be as fast and complete as possible due to hygienic norms since insufficient bleeding and slow death could result in blood clotting in the deep tissues and this might be hazardous in the later stages of slaughtering. Elevation bleeding is more hygienic and is preferred other alternatives as it decreases the potential risk of contaminating the carcass (Heinz, 2008).

This process is usually separated from the operations which will follow. If the blood is not intended for use it should be drained away into a separate pit and should not be allowed to drain into the waste water (Tove, 1985).

Skinning /dehairing

The process will vary according to animal (pigs and cattle). Such process consists of removing the skin of animals. Cutting of the skin is made around the leg with the perspective of exposing and loosen the tendon of the animal's lower leg joint to be used for hanging the carcass, following which the entire skin is removed and the body is prepared for evisceration (Heinz, 2008). This process is usually meant for cattle, goat, deer and sheep. Whereas dehairing is a process normally done in the slaughter of pigs which consists of releasing the bled animal into a pool of boiling water for a couple of minutes and then pulling it out for removal of the hairs before proceeding for evisceration.

Evisceration

Evisceration is the process which consists of removing the internal organs of the abdominal and thoracic cavities. The internal organs are also known as offal and they falls into two categories:

1. Red offal such as the heart, liver and lungs (pluck).
2. Grey offal such as the stomach or intestine (paunch).

To avoid contamination of the carcass through accidental punctures of the intestines and stomach, it is important that the carcass is placed in the hanging position. The body cavity is severed and the intestinal mass and the stomach (the paunch) are pushed slightly out. The liver is held out care is taken not to spill its bitter contents onto the carcass and as such spoil the taste of the meat. The last stage in evisceration is the removal of the contents from the chest cavity. By cutting the diaphragm which separates

the thoracic cavity from the belly, the pluck can be pulled out as a unit (Heinz, 2008). Leakage from the rectum is prevented by tying the anus with a process called “ bagging”.

Splitting and trimming

The carcass is cut down along the backbone and split into two sides using a brisket saw and is then subjected to inspection from an authorized officer for detection of diseases . Trimming is a process that should be performed by trained employees and consists of the removal of visible contamination. All equipment (hooks and knives) should be sanitized between each use to reduce cross-contamination between areas. Carcasses which have been railed out for visible contamination, such as fecal contamination, should be re-conditioned as quickly as possible to get the carcass through the process and back into the system (Harris and Savell et al., 2003).

Delivery

After undergoing all processes in the slaughter line, the carcass is weighed and finally labeled for identification and send for delivery on the local markets.

PRECAUTIONS THAT HAVE TO BE MAINTAINED IN THE SLAUGHTERING PROCESS AS PER HEINZ (2008) INVOLVES THE FOLLOWING:

Disinfection on entering the premises

Every time an authorized officer or member of the staff is to enter the slaughter house, he should undergo a process of disinfection by dipping his boots in a footbath, which is a basin situated at each entrance of the

slaughter line, to avoid carrying infectious agents that might stick to the boots via soil particles.

Bleeding and exsanguinations

The knife used to slaughter each animal should be cleaned and rinsed in hot water. It is known that a contaminated knife can pass on bacteria into the animal tissues during the initial stages of bleeding, that is, when the heart is still in pumping.

Skinning

Knife skinning and the use of bare hands can similarly hosts contaminating organisms on the surface of the carcass. As such washing of the hands is a must after the passage of each carcass to avoid contamination of same.

Evisceration

Extreme care should be emphasized on not to puncture the intestines. The slaughtermen should follow the procedure of tying the end part of the intestine and the severed end of the esophagus, then removing intestine and stomach first, followed by the pluck (heart, liver, and lungs of an animal used as meat, Microsoft Encarta, 2008). The pluck should be hung on a hook while the paunch (stomach) should be dropped in a paunch container. As a matter of hygiene, the stomach and intestines should not be processed while carcass dressing is in operation as any minor splash from same can easily cause contamination of the meat.

Washing

Is a process by which the carcasses undergoes washing with clean potable water. If water is a problem then a dry slaughter process by trained slaughtermen should be used as alternative as it is more appropriate as a safety measure for carcasses to be dry clean than to contaminate them with polluted water.

Offal handling

The offals (stomach and intestines) are the organs from the carcass which contains the greatest load of infectious organisms and for preventive measure must be moved to a separated chamber provided for them. At first they should be emptied of their contents, dried, then cleansed with water.

Personnel

The personal hygiene of the workmen is a primordial factor in slaughtering operations, the reason is simply that contamination of food and disease transmission as such depend equivalently upon the human factor as well as on the tools and mode of operation. Transfer of microorganisms by personnel particularly from hands is of vital importance (Chen et al. 2001, Montville, 2001, Bloomfield, 2003). During handling, bacteria are transferred from contaminated hands of workers to the food and subsequently to other surfaces (Montville, 2002). Low infectious doses of organisms such as shigella and pathogenic Escherichia coli have been linked to hands as a source of contamination (Snyder, 1998). Poor hygiene, particularly deficient or absence of hand washing has been identified as the causative mode of transmission (Reji, 2003). Proper hand washing and disinfection has been

recognized as one of the most effective ways to control the spread of pathogens, especially when considered along with the restriction of sick workers (Alder, 1999, Montville, 2001). Moreover persons with unhygienic habits like spitting, coughing and nose-blowing should not be under umployment. As such it is important to allow access only to the staff into the premises at the time of slaughter and they should be wearing the proper attire, e. g. clean trousers and wearing appropriate waterproof aprons. Boots as well should be worn with the trousers neatly folded inside. And the hallmark is that the workers must strictly abide to a formal code of hygiene.

Hand-washing

As stated by the Centers for Disease Control and Prevention (CDC): “ It is well-documented that one of the most important measures for preventing the spread of pathogens is effective hand washing” (http://en. wikipedia. org/wiki/Hand_washing).

Fundamentally the good habit of careful and frequent hand-washing will definitely reduce contamination. Therefore hand-washing facilities with sufficient water supply is a must in such a delicate process of this kind. Basically the mess room and the working area is where there should be several hand-washing points. If it is situated away from working places, the risk that they will not be used is higher and would probably result in contamination of the meat (Tove, 1985).

Hand-washing should be done by all members if the working staff:

1. before starting slaughter

2. after being to the toilets
3. after being into contact with dirty objects and materials
4. after smoking and eating

The staff should understand that hands is prone to contamination if used for scratching the skin, the hair, clothes and picking the nose. Such acts may cause bacteria to be transmitted to the hands and thereafter infect the meat which is handled by the same hands. The management of slaughter house should provide antiseptic soap or germicidal, coupled with the use of brush for washing of hands since bacteria are often under the nails (FAO animal production and health paper; 53).

Cleaning Operations

For the purpose of sanitation clean water is usually required for the cleaning of equipment, tools floors and walls. Such operation normally starts with removal of solid waste of meat and fat trimmings, pieces of bones, blood clots by scrubbing them off the floor. High pressure water cleaning begins from the walls and finally ends with the floors. Hot water hosing under pressure would be ideal for removing sticky waste from corners and drains.

For scrubbing of other surfaces such as tables, and tools, the use of hard fibre brushes and detergents is suggested. Liquid detergents are more effectual than ordinary soaps, since they dissolve easily in water while absorbing dirt, which is finally removed by flushing. Powdered soap may also be dissolved in water and used. Knives also should be sterilized or boiled in water.

Source: FAO Animal Production and Health Paper – 49, Manual for the slaughter of small ruminants in developing countries, 1985.

DISEASES ASSOCIATED WITH UNHYGIENIC SLAUGHTERING

There are many different ways by which an infectious organism can make its way through the slaughtering process of animals and cause very subsequent diseases. Below is some of the common diseases related to slaughter houses:

Anthrax is a naturally-occurring bacterial disease of animals caused by Bacillus anthracis, which forms spores that generally survive for years in the environment. Cattle, sheep, and goats are at the highest risk but humans can also contract the disease. Most animals are infected by oral ingestion of soil contaminated with the spores.

People may acquire anthrax when in contact with infected hides or hair of animals. The organism is inhaled from contaminated dust, or is eaten in undercooked meat from infected animals, or even penetrates a wound in the skin. Animals that died of anthrax may have blood secreted from the mouth, nose, and anus (Pelzer . K and Currin . N).

In slaughtering process, the bacteria can be transferred from hides of infected animals to the hides of the healthy ones during the immediate pre-slaughter phase in lairage (Small and Buncic, 2009). As such if no particular precaution is taken when removing the hides, the probability of contaminating the carcass is very high.

Brucellosis

Brucellosis is an infectious disease caused by contact with animals carrying bacteria called Brucella which affects a wide variety of animals including dogs, cattle, pigs, sheep, goats and horses. The disease has been known as Malta fever, Bang's disease, Mediterranean fever, rock fever, and goat fever (Microsoft Encarta, 2008). Humans can be infected if in contact with infected meat or placenta of infected animals.

The slaughter of undetected a diseased animal is a threat since contamination may result if, for instance, blood from the infected carcass came into contact with the knife of the slaughterman and the same knife is being used for processing another uninfected carcass during the slaughtering.

In case of ingestion of infected meat, symptoms in humans are undulating fever, headache, joint pain, weakness, and night sweats (Pelzer . K and Currin . N). People who handle meat should wear PPE such as protective glasses and clothing for protection of wounds from infection. Detecting infected animals prior to slaughter controls the infection at its source. Vaccination is actually available for cattle, but not humans (Franco et al, Goldman et al. 2007).

Escherichia coli

Escherichia coli (E. coli) are bacteria which is normally found as a normal flora in the intestines of people and animals. One can get infected after handling or being exposed to feces of a carrier animal (Pelzer . K and Currin .

N). Animals usually carry it without causing disease however when humans are infected, the toxins causes serious illness which ranges from diarrhoea to kidney failure. Personal hygiene is very important, particularly after contact with animal feces, since very few organisms are required to cause infection in humans (Stevenson and Hughes, 1988).

E-coli can be easily contaminate the carcass in the slaughtering process if ;

1. for instance the worker does not wash his hands after being to the toilet, the bacteria will be transferred when handling the meat.
2. care is not taken at the evisceration step when disemboweling the carcass, as such if the intestines get perforated and intestinal matter comes into contact with the meat (Heinz, 2008)

Prevention focuses on hand washing and proper hygiene. Hands and all equipments should be properly disinfected after touching or handling raw meat (Pelzer . K and Currin . N).

Salmonellosis (Gastroenteritis)

Salmonella sp. are bacteria that live in the intestinal tract of carrier animals. The bacteria are shed into the faeces of animals which are particularly stressed during steps such as being yarded and transported (Stevenson and Hughes, 1988).

As in E-coli contamination, salmonella can be transferred to the carcass in the slaughtering line by:

1. slaughtermen who are handling meat after being to the toilet without proper hand washing,
2. fecal matter being in contact with the meat at the evisceration process, if the anus is not bagged properly, and
3. also if the intestines get punctured upon removal and intestinal matter is in contact with the meat.

If hands are not properly washed after contact with infected feces, the accidental ingestion of bacteria may occur (Pelzer . K and Currin . N). Infection also occurs as a result of equipments that are unsanitary. Symptoms generally includes fever, foul smelling diarrhea, and severe dehydration, especially in young children and infants. Life-threatening diseases like meningitis and septicemia may also occur (Montes and DuPont, 2004).

Q-fever (Query fever)

Q fever is a bacterial infection that can affect the lungs, liver, heart, and other parts of the body. It is found around the world and is caused by the bacteria Coxiella burnetii. The bacteria affects sheep, goats, cattle, dogs, cats, birds and rodents as well as some other animals (Goldman and Ausiello, 2007). Humans normally acquire fever, night sweats, and pneumonia and hepatitis in the worst cases (Pelzer . K and Currin . N). Abattoir workers (particularly those dealing with foetuses), veterinarians and farm workers) are the people who are most at risk of contracting this disease (Stevenson and Hughes, 1988).

In slaughtering meat can be contaminated in the process of evisceration whereby feces of contaminated animals have been transferred to the hands of the slaughterman which in turn contaminates other healthy carcasses.

To prevent further spread of Q fever, dead fetuses and reproductive tissues should be buried or burned. Wearing of protective equipment such as gloves and eyewear (PPE) when assisting in birthings and washing of hands thoroughly afterward are highly recommended (Pelzer . K and Currin . N).

LAWS PERTAINING TO THE SLAUGHTERING INDUSTRY IN MAURITIUS

Nowadays not all people are entitled to slaughter animals as it used to be in the past. There are norms and standard which have been set up by the necessary authority to guarantee the safety of the end product to the public. As such in each country there is an institution which is responsible for maintaining this hallmark. In our present situation the regulating body responsible for slaughtering in Mauritius is the MAURITIUS MEAT AUTHORITY (MMA).

The main lines of the re