



PROCESS DESCRIPTION

Slaughterhouse or abattoir operations include slaughtering and various subsequent processing activities ranging from basic cleaning and packaging to animal by-product “rendering” (the processing of inedible animal parts into commercial products such as protein for animal feed). This guideline focuses on the operations in the slaughterhouse. Subsequent processing operations that in some instances may be co-located with the slaughterhouse, including butchery, packaging, smoking, pickling etc are covered in the Meat Processing guideline. Operations relating to Poultry are covered in the Poultry Processing guideline.

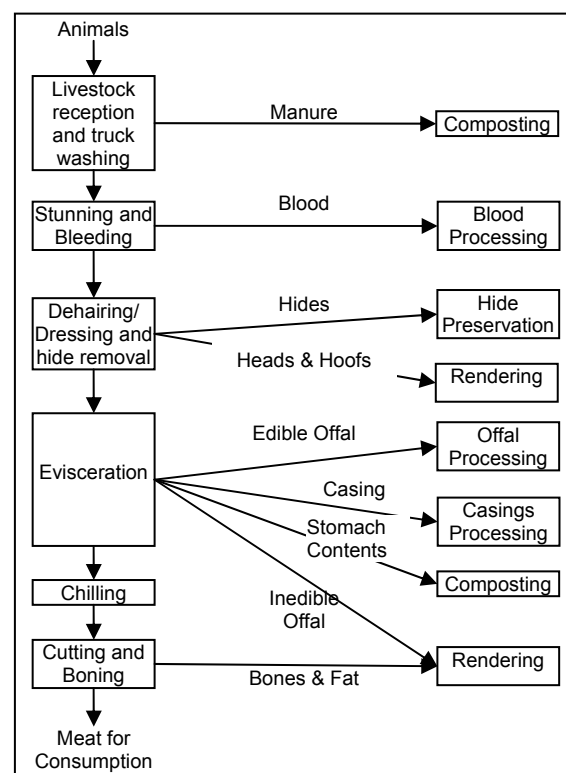
The activities at slaughterhouses may include:

- Receiving area for live animals prior to slaughter;
- Retention area (12-24 hrs) for animals prior to slaughter, sometimes referred to as lairage;
- Stunning and killing of animals - methods include applying direct blow by a club or poleaxe, slaughtering mask, captive-bolt pistols or electrical stunning;
- Bleeding of animals - the objective is to kill the animal with minimal damage to the carcass and to quickly remove as much blood as possible;
- Hide removal and treatment;
- Evisceration (removal of internal organs);
- Carcass dressing and washing;
- Handling and transport of carcasses and meat;
- Casings (intestinal tract) and edible offal separation;
- Refrigeration and/or frozen storage;
- Rendering of inedible products, e.g. bone, fat, heads, hair, and condemned offal into animal feed and tallow. In the EU and some other jurisdictions the rendering operation

must be conducted at a different location to the slaughterhouse.

Animal slaughter can take place on a wide variety of scales from small-scale operations occurring on farms or at butcher’s premises to large-scale abattoirs processing thousands of animals a day. Generally, small-scale operations make limited use of automation and extensive use is made of all by-products meaning that there is little waste and pollution generated. This guide therefore focuses on the medium to larger scale operations.

Meat is the most significant product of slaughterhouses by weight and value but the by-products contribute significantly in terms of commercial value and waste reduction. Uses of by-products include edible offal, edible fats, bone meal, glycerine, gelatine, rennin, animal feed, inedible fats for industrial products, hides and skins, glue and many others.





In some regions, restrictions have been placed on the use of some animal products for human and animal consumption due to outbreaks of a disease called Bovine Spongiform Encephalopathy (BSE) and related diseases, which can affect both humans and other animals

KEY ENVIRONMENTAL, HEALTH AND SAFETY RISK/LIABILITY ISSUES

Product Contamination

Meat can become contaminated as a result of the vegetable matter consumed by the grazing species (e.g. radioactive isotopes, dioxins and pesticides) through a process known as bio-accumulation¹ and during processing and transport (microbiological contamination). Veterinary inspection and screening of raw materials will identify any sick or diseased animals and food hygiene standards will need to be considered in order to reduce the risk of microbiological contamination. Animals that die during transport and sick or dead animals from reception pens should be separated and transported to external facilities in separate containers for treatment and disposal. Carcasses awaiting collection should be appropriately stored to prevent putrefaction;

- Specified risk materials (SRM), i.e. tissues in cattle that may contain the agent responsible for transmission of BSE and related diseases must be carefully separated from carcasses before processing into commercially valuable products and disposed of appropriately. In the EU SRMs are excluded from the human and animal food chain;

¹ Bioaccumulation occurs when an animal absorbs a toxic substance at a rate greater than that at which the substance is lost. The toxin can then become increasingly concentrated in the organism or in the food chain over time.

- Procedures should be in place to prevent processing of waste materials for same species feeding.

The Company's operations should be designed to internationally recognized food safety standards consistent with the principles and practice of Hazard Analysis Critical Control Points (HACCP)² and Codex Alimentarius³.

Water Supply and Effluent treatment

Slaughterhouses use large quantities of fresh water for maintaining clean and hygienic conditions, i.e. watering and washing livestock, cleaning process equipment and areas and washing meat. Water may be used to hose down floors, machinery and containers.

Effluent produced during the slaughtering process may generate pollution problems due to the high content of animal fat, manure, blood, and any cleaning detergents. The effluent from slaughterhouses may need to be treated. In urban areas it is normally discharged to municipal sewage treatment systems but in rural areas effluent may be treated on site and irrigated to land. If poorly managed, this irrigation could result in the pollution of groundwater.

Discharge of the effluent directly to water bodies is discouraged as it can pollute them causing damage to wildlife and the effluent may also contain viruses, bacteria, and parasites which are harmful to humans and animals.

Many facilities have on site wastewater treatment plants, which may utilise mechanical and chemical means of treatment. (In the EU, this is a legal requirement for facilities discharging

² ISO 2005

³ FAO and WHO (1962–2009).



more biodegradable wastewater than an equivalent population of 4,000 people). Solids retrieved from the plant may either be rendered to make blood and bone meal, or be disposed of as solid waste.

Where animals are held on site prior to slaughter, direct runoff to watercourses should be prevented. Manure from the stockyard and from vehicle cleaning should be removed while in solid form.

A permit with specific discharge parameters from the regulatory authorities will normally be required whether discharge is from an onsite wastewater treatment plant or discharge is to a municipal wastewater treatment plant.

Where water abstraction takes place it is typical for abstraction or water use permits to detail volumes of water abstraction allowed as over abstraction can impact local communities. Where ever changes take place in product volumes this should be reflected in the permit.

Energy Consumption

Energy is consumed in abattoirs in two ways:

- Thermal energy in the form of steam and hot water used for cleaning, sterilising and rendering;
- Electricity for machinery operation, refrigeration, lighting and production of compressed air. Minimum refrigeration requirements are normally determined by regulation.

Energy usage has a direct correlation to the operating costs of the company and energy generation and consumption may be regulated or taxes/levies applied to reduce energy use and

associated emissions of gases such as carbon dioxide.

Refrigerants

Slaughterhouses rely heavily on chilling facilities to preserve the products. The refrigerants used may be ozone depleting chemicals, such as Chlorofluorocarbons (CFCs) and Hydro chlorofluorocarbons (HCFCs), the production of which are being phased out under the Montreal Protocol. Releases of these types of refrigerant gases should be avoided. Ammonia is becoming a more commonly used alternative refrigerant, which has no such restriction but does have health and safety issues.

Odour

Odour can be a serious problem for slaughterhouses if by-products and effluent streams are not managed correctly, particularly when the slaughterhouse is located near a residential area or in a hot climate.

The main sources of atmospheric odour are:

- Overloaded effluent treatment systems;
- Untreated effluent;
- Animal wastes (skin, hides, hooves), unprocessed material and any other solid waste;
- Singeing and scalding operations and leaking ducts on rendering equipment.

Slips, Trips and Falls

- Slippery floors and surfaces caused by oil and fat deposits present a high risk of slips, trips



and falls where spills have not been cleared up or effective cleaning has not taken place;

- Crush injuries caused by inadequate escape routes in livestock handling areas.

Sharp Edges and Machinery

Sharp tools are used to process meat including knives, bandsaws, mincers and packaging equipment. Cuts may also occur from sharp bones and equipment edges. All equipment should have safety guarding and workers should be issued with appropriate Personal Protective Equipment (PPE) to protect against unavoidable sharp items and edges.

Manual Handling and Repetitive Work

Lifting, repetitive work and posture injuries occur because of lifting and carrying heavy or awkward shaped items such as animal carcasses, live animals, manure and other solid wastes. Repetitive tasks, such as boning, slicing and cleaning, can lead to musculoskeletal injuries.

OTHER ENVIRONMENTAL, HEALTH AND SAFETY RISK/LIABILITY ISSUES

Emissions to Air

Particulate emissions may arise during pigskin singeing processes and from dust in livestock handling areas.

Solid Wastes

Non-meat products from slaughterhouses include:

- Manure and bedding material from animal transport and reception which can be composted;

- Edible by-products, e.g. blood and liver;
- Inedible products, e.g. hair, bones;
- Fat (recovered from waste water by fat separators);
- Non-recoverable waste materials that require final disposal, including specified risk materials.

Slaughterhouses are generally very efficient in the management of solid waste materials as nearly all parts of the animal have a commercial value. However, recent regulations to control the transmission of BSE and related diseases require that specified risk materials (SRM) are removed and destroyed, i.e. tissues in cattle that may contain the agent responsible for transmission if processed into animal feed or consumed by humans.

Unwanted remains must be disposed of in a hygienic manner approved by local health authorities.

Permitting

Large slaughterhouses and rendering facilities in the EU are subject to national regulations under the Integrated Pollution Prevention and Control Directive (2008/1/EC). Other smaller facilities within the EU and operations outside the EU will still be subject to local regulation but this will generally set less stringent requirements on the techniques to be adopted.

Exposure to Biological Hazards

Exposure to biological and microbiological agents due to inhalation and ingestion of dust and aerosols, and ingestion and skin contact during carcass handling and cleaning processes;



Hazardous Substances

The cleaning and disinfecting of process areas and livestock areas uses materials that if inappropriately used and stored could result in chemical contact burns to employees, inhalation of harmful/toxic fumes or ingestion of harmful substances.

Ammonia, which is commonly used as a replacement for Chlorofluorocarbons (CFC's) in refrigeration systems, is toxic if inhaled at high concentrations and can cause frostbite when released to the atmosphere. Facilities using ammonia refrigeration should be aware of the potential hazards of ammonia releases and of the steps that can be taken to prevent such releases. They should be prepared to respond appropriately if releases do occur.

Temperature

Fluctuating internal climatic conditions ranging from refrigeration areas to scalding, singeing, flaming operations. Refrigeration systems will result in very cold temperatures, which can result in frostbite and contact burns. High temperatures can lead to collapse through heat exhaustion and contact burns.

Noise and Vibration

Noise and vibration from stunning animals, saws, steam, condensers, ventilation, banging equipment and pressurised air equipment can reach levels in excess of those regarded as healthy.

KEY SOCIAL, LABOUR AND COMMUNITY RISK/LIABILITY ISSUES

Hygiene

- Hygiene standards should be addressed in treating, handling and storage of animals and meat in all stages of production process;
- Regular hygiene and animal health checks should be carried out at all stages of the process, including for example:
 - Maintenance of high standards of cleanliness throughout the slaughterhouse;
 - Humane transport and care of animals is becoming an increasingly significant issue with potential impact on sales and markets;
 - Inspections of live animals by a veterinarian prior to slaughter are required in some instances in addition to inspection of carcass following slaughter;

Animal Welfare

Slaughterhouses within the EU will be subject to Council Directive 93/119/EEC, which sets out requirements for the treatment of animals prior to slaughter. It also requires that animals must be stunned before slaughter or killed instantaneously, unless authorised for religious slaughter.



OTHER SOCIAL, LABOUR AND COMMUNITY RISK/LIABILITY ISSUES

Noise

The noise generated by equipment, livestock holding areas and trucks delivering livestock and removing by-products and carcasses can be a nuisance if the site is located close to where people live and work.

Fumes

Slaughterhouses may use chemicals which if incorrectly used could release into the surrounding environment resulting in inhalation of harmful fumes by the general public;

FINANCIAL IMPLICATIONS

- If contaminated meat were permitted to enter the animal and human food chain, the financial implications on a business may be significant. Financial impacts may arise from compensation claims, loss of reputation, loss of contracts and market share. Significant upgrades in hygiene standards may be required at the production facility in order to reduce the risk of contamination during processing and to satisfy national and European food hygiene standards;
- If blood and fat are allowed to enter the effluent stream, the cost of treatment increases and this represents the loss of valuable by-products;
- Environmental standards for odour control, waste disposal and effluent control and treatment may require capital investment, new equipment or increase operation cost of the whole process;

- Specific national or international legislation or customer requirements relating to, for example, animal welfare, meat product hygiene standards, product storage and packaging and waste disposal may require modification to production processes and equipment increasing overall production costs or requiring additional capital investment;
- Replacement of refrigerant gas or equipment may be required to meet international standards;
- Where large quantities of energy are used then this can result in high operating costs to the business;
- Income may be generated through sale of by-products, for example for use in animal feed or in the soap industry;
- Injuries may lead to increased payroll costs to replace skilled workers and lost production time;
- Fines, penalties and third party claims may be incurred for non-compliance with environment, health & safety regulations.

IMPROVEMENTS

Environmental Improvements

- Good housekeeping should be maintained at all times in retention areas as well as in the slaughter house. The adoption of good cleaning and working practises as a routine will reduce odour emissions and improve hygiene standards. Discharges of animal wastes to the water treatment plant should be minimised;



- Regular, rigorous hygiene monitoring programmes should be in place. All surfaces and equipment should be cleaned regularly to prevent build-up of oil and fat and to reduce risk of health hazards;
- Consider implementing animal traceability systems that facilitate tracing of animal parts so that all materials from carcasses detained by veterinary inspection can be removed and products can be tracked once released for sale;
- Design chimneys and vents at sufficient height and appropriate position to avoid causing a local nuisance;
- Store processed and unprocessed meat and animal waste in a separate enclosed store with ventilation designed to minimise odours;
- Animal matter should be processed as soon as possible to reduce problems with offensive smells;
- Control dust by maintaining a sufficient level of humidity in pens and yards; minimising surface areas with exposed soil and by planting hedges or erecting fences to minimise wind turbulence.
- Reduction in refrigeration losses from cooling plants through use of insulation;
- Controls to maximise the efficiency of cooling plants;
- Consider changing to non-CFC coolants and/or sealing of leakages in the refrigeration system;
- Regular inspection should be carried out of all bulk containment facilities and effluent holding tanks to ensure integrity of storage;
- Reduction in water volume used through the use of high-pressure hoses and re-use and recirculation of water and use of re-circulated chilled water systems where practicable;
- Fat interceptors should be installed on all drains and should be inspected and cleaned regularly;
- Install grids to reduce solid materials into the waste water drainage system;
- Installation (or upgrade) of equipment to treat wastewater;
- Separate cooling water from process water;
- Effluent holding tanks and treatment facilities should be checked regularly;
- Implement procedures to ensure solid waste is removed from transport equipment and surface areas before rinsing and washing, e.g. using scrapers, brooms and vacuum cleaners;
- Recover and process blood and other material into useful by-products;
- Opportunities to generate income and reduce waste disposal costs through the sale of animal by-products should be considered;
- Send waste organic material to a rendering plant and design and operate the rendering plant to minimise odour generation;
- Consider animal welfare during transport and holding of animals prior to slaughter. Also good animal husbandry during transport and



at the slaughterhouse is likely to lead to less damage to meat products; good animal welfare standards will vary from one country to another, but are likely to relate to numbers of animals being transported in a specified size of vehicle or space; food and watering arrangements and the need to exercise animals if long journeys take place.

- Potentially allow efficient veterinary inspection, including examination of medical certificates for the animals;
- Provide separate storage and disposal arrangements for animals that are sick or dead on arrival;

Health and Safety Improvements

- Provision of personal protective equipment (PPE) that is fit for the task to prevent injury and maintain hygiene standards. Staff should be trained in the correct selection, use and maintenance of PPE; the training should include the reasons for its use and the dangers of not using it. PPE should be inspected regularly and maintained or replaced as necessary;
- Train workers in correct use of machinery and safety devices;
- Provision of segregated worker welfare areas;
- Separation of people from moving equipment:
 - Ensure that the process layout reduces opportunities for process activities to cross paths;
 - Install correct guarding to reduce risk of entrapment of employees;

- Install walkways to separate people from vehicle movements to reduce risk of collision;

- Install escape routes for employees in livestock handling areas;
- Walking and working surfaces should be kept clean and dry and workers provided with anti-slip footwear. Floor cleaning should be scheduled for a time when work is not in progress or has finished;
- Ensure correct clean up programmes for liquids: restrict access to areas being cleaned down or where spillages have occurred;
- Install mechanical lifting aids where possible and rotate work tasks to reduce repetitive activities and redesign of manual processes to avoid heavy lifting/repetitive activities;
- To reduce the risk of noise exposure isolate noisy equipment and rotate tasks to minimise time spent in a noisy area and provide PPE when appropriate;
- Restrict times for people being in very cold or very hot areas.

Social, Labour and Community Improvements

- Consider animal traceability systems that facilitate tracing once released for sale. In some regions this may be mandatory;
- Potentially ensure adequate veterinary inspection is carried out at appropriate points in the production process. Again, in some regions this may be mandatory.



GUIDE TO INITIAL DUE DILIGENCE SITE VISITS

During the initial site visit, the issues will vary according to the size of operation, the range of animal species slaughtered, and depending on the level of environment, health & safety management already introduced. While visiting the site it is important to discuss and review the following:

- Check the condition of the wastewater treatment plant and location of discharge points for wastewater from the facility. Note the colour and appearance of adjacent watercourses;
- Note whether the wastewater treatment plant discharges to a local watercourse or the municipal wastewater treatment works. Higher environmental risks will be associated with facilities discharging to water courses;
- Check the condition of storage facilities for chemicals;
- Discuss the procedures and controls around screening of raw materials and products for potential contamination from pesticides, herbicides, radioactivity, heavy metals, industrial pollutants;
- What is the standard of “housekeeping” on site? Do areas look clean and tidy? Look for build up of fat and oil on floors and surfaces, evidence of any recent spills or releases of raw materials/product. Look for evidence that the walking and working surfaces are kept clean and dry;
- Observe food hygiene standards at the facility and the results of previous food hygiene inspections, e.g. Separate welfare areas for workers; Are staff are wearing PPE?; food traceability systems;
- Check signage around the site:
 - Does it convey the health and safety risks?
 - Are fire exits clearly marked?
 - Are there separate routes for pedestrians and vehicles painted on floor?
- Is fire fighting and first aid equipment available?
- Check the age and condition of equipment, look for signs of wear and tear, degradation, leaks and breaks;
- Check that solid waste storage and disposal (storage equipment) is in a good condition;
- Check that waste disposal takes place on a regular basis;
- Check that waste storage areas are clean of debris and that skips are covered to prevent waste escaping, for example, check that waste containers have lids or are stored in an area with a roof;
- Check animal housing conditions, observe livestock yards to see if animals are moved calmly into facility and that workers have escape routes, check slaughter methods and humane handling;
- Have the premises been inspected recently (within the past 2 years) by the regulatory authorities for health, hygiene and environment? What were their findings?



- Review measures for controlling potential odours from the plant during the operation in the slaughterhouse or transportation;
 - Check for automatic safeguards on machinery to prevent accidental injury;
 - Have there been any recent (within the last three years) incidents on site such as fatalities, fires/explosions, spills? Are there insurances in place to cover such incidents?
 - Is the facility subject to any audits by customers? What was the outcome of these audits?
 - Does the business plan have line items for Environment, Health and Safety improvements?
 - Check the conditions and duration of validity for all permits.
- penalties, fines, major recommendations or corrective action plans?
 - Does the organisation have a grievance mechanism which allows employees to raise workplace concerns?
 - Are employees free to form, or join, a worker's organisation of their choosing?
 - Consider installing product traceability systems that facilitate tracing and recall of products once released for sale.
 - Does the organisation have insurance in place to cover the recall of contaminated products? Have there been any recent product recall incidents? What other insurances does the company have in place?

Take note/ask questions relating to any activities that address the improvements listed in the improvements section of this document.

Social, Labour and Community

- Check that labour standards, contracting and remuneration are in line with national law and are consistent with the average for the sector;
- Check that hours worked, including overtime, are recorded and staff should receive written details of hours worked and payment received;
- Check that wages and working hours are consistent with the average for the sector and national standards;
- Has the Company received inspections from the local labour inspectorate in the previous three years? Have these resulted in any

ACTION PLANS

Dependent on the individual business, select appropriate improvements from the list above to include in the action plan. As a minimum, any business should be required to have the following in place:

- Operational procedures to manage environmental, health & safety risks;
- Monitoring programmes;
- Improvement objectives, targets and project plans;
- Training for personnel;



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- Regular inspections, checks and audits with records to demonstrate achievement of the required level of performance against legal requirements and improvement action;
- Emergency plans for environment, health & safety accidents;
- Management review/demonstrated involvement in environment, health & safety management.



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