European Bank
for Reconstruction and Development

Sub-sectoral Environmental and Social Guidelines: Meat Processing

PROCESS DESCRIPTION

Meat is defined as those animal tissues that are suitable for use as food. These are the main soft tissues of the carcass: muscle, mainly skeletal (30-65%), fatty (10-45%) and connective tissues[1]. Internal organs and blood are also used.

Meat processing plants purchase animal carcasses, meat parts and other materials to manufacture sausages, cooked meats, cured meats, smoked meats, canned meats, frozen and fresh meat cuts, natural sausage casings and other specialities.

These activities are performed to increase the shelf life of the product. Brining, curing and pickling typically involve injection of a saline solution, followed by a massaging process to ensure mixing of ingredients and product additives. The processing operation may be carried out separately or in conjunction with slaughterhouses.

The typical processes include:

- Carcass reception;
- Chilling;
- Primary processing - cutting, portioning and trimming;
- Packaging of primary meat cuts by vacuum or CO_2 gas film and/or boxed and palletised;
- Secondary processing, e.g.
  - Defrosting, deboning, fat removal, trimming;
  - Fat rendering;
  - Grinding;
  - Ingredient application;
  - Preservation techniques include heat, such as cooking (e.g. in water bath, shower, steam, and hot air ovens) and dehydration, fermentation, brining, curing, pickling, and canning;
  - Meat product fabrication from comminuted[2] meat, fat and offal, e.g. Sausages, hamburgers;
  - Packaging, freezing of meat products;
- Cleaning.

KEY ENVIRONMENTAL, HEALTH AND SAFETY RISK/LIABILITY ISSUES

Product Contamination

Meat products can become contaminated through:

- Contaminated meat received from the slaughter house, drug and chemical residues, and from contamination of other raw ingredients e.g. dioxins and other fat soluble pesticides;

- Poor food hygiene standards within the processing operations, e.g. unclean machines, unhygienic handling;

- Failure in the processing operation, e.g. under cooking, failure to maintain chilled conditions, sterilisation failure, and poor seals on vacuum packs etc.

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)[3] and Codex Alimentarius[4].

[1] FAO 1991

[2] Breaking down or grinding of meat into small particles, e.g. mincing or shredding

[3] ISO 2005

[4] FAO and WHO (1962–2009).

Water Supply and Effluent Treatment

Meat processing plants use large quantities of fresh water for maintaining clean and hygienic conditions, i.e. cleaning process equipment and areas, water may also be included within processed meats.

Effluent produced during the meat processing may generate pollution problems due to the high content of animal fat, blood, and any cleaning detergents. The effluent may need to be treated and usually requires hot water spraying to dislodge fats that have accumulated in the on-site drainage system. 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 salts dissolved in the effluent having an adverse impact on soil quality and increased salinity and pathogens being released. The high nitrogen (from blood) content can also negatively affect groundwater quality.

Discharge of the effluent directly to water bodies is discouraged as it can pollute them causing damage to the environment. The effluent may also contain pathogenic and non-pathogenic viruses, bacteria, and parasite eggs.

Many facilities have on-site wastewater treatment plants which may utilise mechanical and chemical means of treatment. Solids retrieved from the plant should be rendered to make blood and bone meal where feasible, or be disposed of as solid waste.

A permit with specific discharge parameters from the regulatory authorities will normally be required whether discharge is from an on-site waste water treatment plant or to a Municipal waste water 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

Energy is consumed in meat processing plants 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

Meat processing plants rely heavily on chilling facilities to preserve the products. The refrigerants used may be ozone depleting chemicals, such as Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (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 meat processing plants if effluent streams are not managed correctly, particularly when located near a residential area or in a hot climate.

The main sources of atmospheric odour are:

- Cooking of animal materials;
- Animal residues;
- Decomposition of organic matter;
- Overloading effluent treatment systems can result in the emission of hydrogen sulphide and other compounds;
- Untreated effluent.

Solid Wastes

Except in small butchery operations, packaging is almost universally used to protect and preserve meat products. This may be plastic, tin-plate cans, aluminium cans, cardboard, shrink wrap, glass, polystyrene. This material becomes part of the wastestream. Where possible companies should attempt to recover packaging or should ensure that the packaging is easy to recycle. Solid waste will arise from the packaging process in the form of discarded packaging offcuts and improperly packaged meat products.

Organic wastes arising from meat processing can normally be processed by into commercial products such as animal feed at a rendering plant and therefore should not form part of the waste stream.

Solid wastes should be stored in adequate containers and segregated where possible to encourage recycling. Solid wastes will need to be disposed of regularly to avoid odour, litter, fly and rodent problems.

Packaging

Companies operating with the European Union (either as a manufacturer or as a supplier into European Union countries) will be subject to the European Union Packaging & Packaging Waste Directive (94/62/EC), which aims to reduce the amount of packing that is being introduced into waste streams.

Manual Handling and Repetitive Work

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

Noise

Noise induced hearing loss can occur from working in noisy areas.

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.

Sharp Edges and Machinery

Sharp tools are used to process meat including knives, bandsaws, derinders, 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 to protect against unavoidable sharp items and edges.

OTHER ENVIRONMENTAL, HEALTH AND SAFETY RISK/LIABILITY ISSUES

Emissions to Air

In addition to the emissions resulting from fuel consumption, particulate emissions may arise during operations to smoke meat leading to reduced air quality. There might be permits in place for controlling releases to air.

Noise

The noise generated by equipment such as saws, steam, condensers, ventilation, banging equipment, canning and bottling lines and pressurised air equipment as well as manoeuvring trucks can be a nuisance if the site is located close to residential areas and other sensitive receptors.

Permitting

Large meat processing 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.

Allergic Reactions

Employees can have allergic reactions to some ingredients, e.g. spices, used as additives in meat processing;

Inhalation

Carcinogenic risk from the inhalation of substances arising from smoking meat products.

Hazardous Substances

- Cleaning and disinfecting process 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;

- Exposure to ammonia from leakage from refrigeration equipment; Ammonia, which is commonly used as a replacement for Chlorofluorocarbons (CFCs) 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

- Refrigeration systems will result in very cold temperatures, which can result in frostbite and contact burns. High temperatures associated with scalding, singeing and flaming operations can lead to collapse through heat exhaustion and contact burns;

- Ill health can also result from prolonged working at low temperatures.

KEY SOCIAL, LABOUR AND COMMUNITY RISK/LIABILITY ISSUES

- Hygiene standards should be addressed in treating, handling and storage of meat in all stages of production process;

- Meat processing uses chemicals and substances, for example, ammonia or caustics, which if incorrectly used could

release into the surrounding environment resulting in inhalation of harmful fumes by the public.

FINANCIAL IMPLICATIONS

- Product recall can have a significant impact, e.g. compensation claims, loss of reputation, loss of contracts and in terms of export markets. 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. A system of product traceability may be required to facilitate product recall;

- 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;

- Many countries are signatories to the Kyoto Protocol and have adopted targets for the reduction of CO_2 emissions. Where Governments have set up carbon emission reduction programmes industrial processes have been required to reduce their CO_2 emissions through the setting of targets. This can result in a need for substantial investment in new/clean technologies to achieve the emission targets. These targets may be reflected in environmental permits;

- 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;

- Capex investment in new plant and equipment may be required to meet new environmental, hygiene and health and safety legislation and/or standards.

- Fines, penalties and third party claims may be incurred for non-compliance with environment, health & safety regulations.

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;

- Consider implementing product traceability systems that facilitate tracing of products once released for sale;

- 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;

- Design chimneys and vents at sufficient height and appropriate position to avoid causing a local nuisance;

- Upgrade storage of processed and unprocessed meat and animal waste to an enclosed store with ventilation with suitable particle air filter equipment. Ventilation equipment should be provided to maintain

an adequate negative pressure within processing and clean areas to minimise the possibility of odours escaping to atmosphere without treatment;

- Animal matter should be processed as soon as possible to reduce offensive smell problems;
- Design and operate the rendering plant to minimise odour generation.
- Regular inspection should be carried out of all bulk containment facilities on site to ensure integrity of storage;
- Separate cooling water from process water;
- Reduce 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;
- Install fat interceptors on all drains and ensure these are inspected and cleaned regularly;
- Installation (or upgrade) of effluent treatment plant;
- Install grids to reduce or avoid introduction of solid materials into the waste water drainage system;
- Implement a routine of inspecting effluent holding tanks and treatment facilities 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;
- Consider opportunities to generate income and reduce waste disposal costs through the sale of waste meat products;
- Send waste organic material to a rendering plant;
- Consider changes to non-CFC coolants and/or sealing of leakages in the refrigeration system;
- Reduce refrigeration losses from cooling plants through use of insulation;
- Implement controls to maximise the efficiency of cooling plants;
- 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;
- 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;

- Redesign of manual processes to avoid heavy lifting/repetitive activities;
- Install mechanical lifting aids where possible and rotate work tasks to reduce repetitive activities;
- Walking and working surfaces should be kept clean and dry and workers provided with anti-slip footwear. Restrict access to areas being cleaned or where spillages have occurred.
- To reduce the risk of noise exposure by isolating noisy equipment and rotate tasks to minimise time spent in a noisy area and provide personal protective equipment;
- Restrict times for people being in very cold or very hot areas.

GUIDE TO INITIAL DUE DILIGENCE SITE VISITS

During the initial site visit, the issues will vary according to the type of meat product being produced and depending on the level of environment, health and safety management already introduced. While visiting the site it is important to discuss and review the following:

Environment, Health and Safety

- Check the condition and efficiency of wastewater treatment plant and location of discharge points. 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;
- 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 demarcated 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 clear 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;

- Review measures of controlling the odour coming out from the plant;
- Does the organisation have insurance in place to cover the recall of contaminated products? Have there been any recent product recall incidents?
- 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?
- Have the premises been inspected recently (within the past 2 years) by the regulatory authorities for health, hygiene and environment? What were their findings?
- Does the business plan have line items for Environment, Health and Safety improvements?
- Check the conditions and duration of validity for all permits.

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 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.

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

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;

- 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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