European Bank
for Reconstruction and Development

# Sub-sectoral Environmental and Social Guidelines: Animal Feed Processing

## *PROCESS DESCRIPTION*

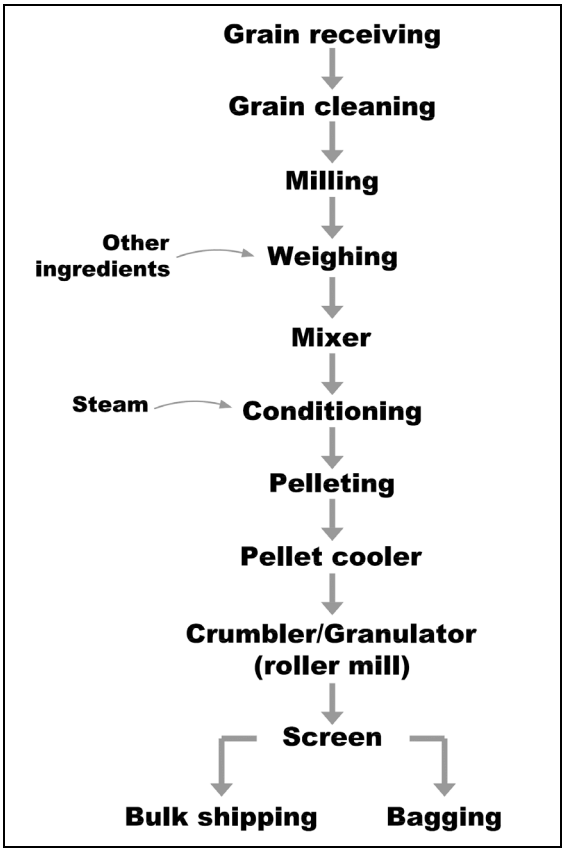
This guideline covers the preparation of compound animal food, for example in feed mills, and includes the preparation of protein concentrates and other mixtures which are added to cereal mixes. The process converts widely ranging raw materials into a mixture suitable for producing a desired nutritional response within the animal to which it is fed.

Over 200 ingredients have been identified in feed including grain, by-products (e.g. meat meal, bone meal, waste vegetables), medicines, vitamins and minerals. Some raw materials may have undergone extensive processing prior to inclusion into an animal feed, e.g. extraction of oil from oilseeds by solvent or mechanical means, production of fish and meat meal be rendering of waste products of fish and meat processing operations.

The manufacture of wet pet foods is not included within this guideline as the operations performed are mainly covered within the guidelines on Meat Processing.

The main activities include:

- **Receipt of raw materials:** such as grain, protein, vitamins, minerals, oils fats and medicinal additives;
- **Sampling:** Raw materials may be variable in composition and quality – routine sampling will detect such variations; samples of finished product should also be taken as small variations in composition can have a marked adverse effect on animal health.
- **Drying and storage of grain:** Moisture content directly affects biological and pest activity within the materials and should be kept as low as possible;
- **Weighing:** accurate weighing of raw materials according to the feed formulation is critical;
- **Processing:** e.g. grinding, mixing, liquid addition, oil extraction, extrusion, de-hulling, pelleting;
- **Packaging and despatch:** loaded into palletised bags or bulk distribution via bins or trucks.




Source: adapted from US EPA 1995

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## *KEY ENVIRONMENTAL, HEALTH AND SAFETY RISK/LIABILITY ISSUES*

### *Product Contamination*

Animal feed can become contaminated through:

- Receipt of contaminated raw materials e.g. chemical residues, pathogenic bacteria such as salmonella, antibiotic residues and debris such as metal, wood, or stones;
- Poor storage conditions e.g. raised moisture levels promoting insect, mould and bacterial growth;
- Poor hygiene standards within the processing operations, e.g. unclean machines, unhygienic handling.

A system of feed traceability is required through the feed chain.

### *Dust and Aerosols*

Dust may arise from storage, handling and drying activities; aerosols typically arise from the use of compressed air and high-pressure water for cleaning.

- Workers may inhale or ingest dust and aerosols exposing them to biological and microbial hazards which present a risk of occupational lung disease. When combined with high levels of humidity they may give rise to skin irritation or allergic reactions.
- A dust cloud of any flammable material (such as grain) will explode where:
    - The concentration of dust in air falls within the explosive limits; and
    - A source of ignition is present.
- The most common locations for fire and explosion are in driers, grinding mills and hot work on plant. The grinding operation may generate considerable quantities of heat and dust and the temperatures of raw materials may rise by 10 - 20°C.

Dust emissions can be controlled by enclosing processing and transport equipment, which also reduces product losses, and the installation of extraction equipment.

### *Storage*

Bulk storage facilities will be used for the storage of raw ingredients, finished product, chemicals used in the production process and for cleansing and disinfection, and fuel oils for energy production. These storage facilities should be provided with satisfactory containment (concrete walls/bunds, recessed drainage gullies connected to effluent treatment areas) to prevent spills reaching the wider environment. The storage facilities should be secure to prevent pest invasion, be waterproof and well ventilated. Alarms may be fitted to detect leakages. All outdoor bulk storage of dusty, or potentially dusty materials should be in silos and ventilation/extraction equipment used to minimise dust generation. Bulk storage facilities should be fitted with alarms to prevent overfilling. Processed feed should be stored separately to unprocessed materials to prevent cross-contamination.

### *Solid Wastes*

Feed can be transported loose or in reusable containers for bulk delivery or in bags filled directly from mixers or holding bins. Wastes may arise through the packaging process in the

form of incorrectly packaged feed and packaging offcuts.

Some waste feed products may be capable of being recycled into the feed production process but others may contain substances, which prohibit this disposal route, and these wastes must be isolated, identified and disposed of in accordance with local regulations and not used as feed.

***Water supply***

Water of a suitable drinking quality for animals (i.e. free from contaminants and sediment) is required for:

- Steam conditioning during the pelleting operation if the mill has a steam conditioner;
- Addition to the mixer to raise the moisture content of the meal to a level suitable for pelleting.

Water will also be used for cleaning and disinfecting machinery.

Water may be obtained from a mains supply or by abstraction from rivers or boreholes. 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***

Processing operations may consume energy as:

- Thermal energy in the form of steam and hot water used for processing, cleaning, sterilising;
- Electricity for machinery operation, lighting and production of compressed air.

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.

***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 sacks, lifting of boxes and manoeuvring carts/manual forklifts within the plant. Repetitive tasks such as the operation of machines can lead to musculoskeletal injuries.

***Collision***

In a busy manufacturing environment it is common to have injuries where people are struck by moving or falling objects such as crates, boxes, equipment, conveyors and forklift trucks.

## *OTHER ENVIRONMENTAL, HEALTH AND SAFETY RISK/LIABILITY ISSUES*

***Wastewater Treatment***

Operations producing prepared meals may produce wastewater with a high organic content. However, other operations producing compound animal feed generate practically no significant quantities of wastewater.

Wastewater will arise primarily from cleaning, surface water runoff and steam condensate. These present a significant risk if allowed to

enter a watercourse without treatment as they may contain:

- Powdered organic material, e.g. grain, protein meal;
- Medicinal additives;
- Cleaning products;
- Solvent and oils used in equipment operation;
- Oils, fats and molasses from blended products.

Animal feed plants normally discharge to the municipal wastewater treatment system but some onsite pre-treatment may also be required.

Waste water discharge from animal feed processing will typically require a permit.

***Odour***

Odour can be an issue particularly where products are mixed with fats or molasses. Environmental permits may place requirements on the design and height of chimneys and vents to maximise dispersion.

***Noise***

The noise generated by equipment such as hammer mills, grinders, ventilation, banging equipment, and manoeuvring trucks can be a nuisance if the site is located close to residential areas and other sensitive receptors.

***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 and Packaging Waste Directive (94/62/EC), which aims to reduce the amount of packing that is being introduced into waste streams.

***Confined Spaces***

Storage silos are dangerous confined spaces and entry to them must be strictly controlled and avoided wherever possible.

***Noise***

Noise induced hearing loss can occur from working in noisy areas, e.g. hammer mills, grinders.

***Machinery***

All equipment should have safety guarding and workers should be issued with appropriate personal protective equipment to protect against unavoidable sharp items and edges. Particular attention should be paid to conveyors, mills, mixers, rotary valves, pelleting presses and packaging machinery.

***Slips, Trips and Falls***

Slippery floors and surfaces caused by oil deposits present a high risk of slips, trips and falls where spills have not been cleared up or effective cleaning has not taken place.

***Hazardous materials***

Cleaning and disinfecting process areas and some food preservation processes use materials that if inappropriately used and stored could result in chemical contact burns, inhalation of harmful/toxic fumes or ingestion of harmful substances.

***Permitting***

Companies operating with the European Union (either as a manufacturer or as a supplier into European Union countries) will be subject to the EC Regulations 183/2005 which lays down requirements for feed hygiene. It requires all establishments producing feed supplied within the EU to be registered and inspected. It also requires that establishments within the EU exporting to non-EU companies must satisfy the requirements of EC Regulation 278/2002 relating to food law and safety. Suppliers into the EU must comply with EU Directive 2002/32/EC on undesirable substance in animal feed. This directive sets maximum levels for undesirable substances in feedstuffs for circulation in the EU.

## *KEY SOCIAL, LABOUR, AND COMMUNITY RISK/LIABILITY ISSUES*

- Trucks delivering bulky raw materials may cause traffic congestion or excessive noise;
- Dust can be a nuisance to the surrounding locality.

## *FINANCIAL IMPLCATIONS*

- The characteristics of feed production and the complexity of the distribution chain mean that it is difficult to withdraw feed from the market. Consequently, the cost of rectification is often borne by public funds[1];
- Product recall can have a significant impact, e.g. compensation claims, loss of reputation, loss of contracts and market share. Significant upgrades in quality control standards may be required at the production facility in order to reduce the risk of contamination during processing and to satisfy national and international food hygiene standards. A system of product traceability may be required to facilitate product recall;
- 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;
- Where large quantities of energy are used then this can result in high operating costs to the business;
- Capital investment in new equipment may be required in order to meet new environmental, hygiene and health and safety legislation;
- 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 and safety regulations.

[1] EU, 182/2005/EC paragraph 22.

## *IMPROVEMENTS*

### *Environmental Improvements*

- Reduce dust emissions by:
  - Enclosing and sealing plant and equipment to prevent escape and accumulation of dust;
  - Use of doors/plastic strip curtains on building access points;
  - Redesigning processes to reduce free-fall distances and speed of movement for grain and other dry products;
  - Installing windbreaks and covers in outside handling areas;
  - Replace any external bulk storage areas with silos, fitted with alarms to prevent overfilling;
  - Install a centralised piped vacuum cleaning systems;
  - Installation of dust extractors e.g. cyclones and fabric filters;
  - Improving ventilation within buildings;
  - Maintaining a slight negative pressure within storage vessels such as bins and silos;
  - Install dust monitoring equipment at the most sensitive points;
- Reduce the risk of fire and explosion by:
  - Reducing dust emissions as above;
  - Improved removal of metal, stones and glass which can cause sparking;
  - Locate equipment within a lightweight building so that the roof and wall cladding panels can act as explosion relief;
  - Consider locating grinding equipment in a separate building;
  - Fit silos and bins with extraction systems to reduce the risk of explosion;
- Reduce spoil and loss by:
  - Weather proofing windows, doors and other openings against pests and water;
  - Controlling moisture content in grain storage;
- Monitor product losses during processing operations;
- Ensure organic waste is collected and stored separately from other waste to enable composting and/or use for soil amendment, or use in energy production;
- Regular inspection should be carried out of all bulk containment on site to prevent leakage and product loss;
- Provision of secondary spill containment for storage and process vessels;
- Good housekeeping should be maintained at all times all areas. The adoption of good cleaning and working practises as a routine will reduce odour emissions and improve hygiene standards;

- Upgrade exhaust stack heights from cooking processes to minimise air pollution and nuisance to the local community.

***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. PPE should be inspected regularly and maintained or replaced as necessary;

- Train workers in correct use of machinery and safety devices;

- Redesign manual processes to avoid heavy lifting/repetitive activities;

- Install mechanical lifting aids where possible and rotate work tasks to reduce repetitive activities;

- Separation of people from moving equipment;

    - Ensure that the process layout reduces opportunities for process activities to cross paths;

    - Installation of safeguards on moving parts of conveyor belts and packaging machinery to reduce risk of entrapment of employees;

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

- Walking and working surfaces should be kept clean and dry. Restrict access to areas being cleaned or where spillages have occurred. Floor cleaning should be scheduled for a time when work is not in progress or has finished for the day and the floor should be dried as much as possible;

- To reduce the risk of noise exposure isolate noisy equipment and rotate tasks to minimise time spent in a noisy area over an eight hour period and provide personal protective equipment where people have to enter noisy areas;

- Ensure all electrical equipment in wet areas is safe;

- Redesign processes where practicable to remove dust and aerosol generating activities.

***Community Health and Safety Improvements***

- Implement a quality control plan including:

    - Sampling procedures and frequencies;

    - Analysis methods;

    - Destination of non-compliant product;

    - Records and samples of the ingredients used and of each product batch;

- Product traceability systems that facilitate tracing of products once released for sale.

## *GUIDE TO INITIAL DUE DILLIGENCE SITE VISITS*

During the initial site visit, the issues will vary according to the type of feed 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:

- Check the condition and efficiency of any wastewater treatment plant present and location of discharge points. Note the colour and appearance of adjacent watercourses;
- Note whether the plant discharges to a local watercourse or the municipal wastewater treatment works;
- Check the condition of storage facilities for chemicals;
- Discuss procedures to check the source of raw materials and screening for contamination, in particular, check which contamination parameters are analysed (e.g. 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 dust 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;
- Are staff wearing Personal Protective Equipment?
- Is there a quality control system? Is there a food traceability system;
- 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;
- 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 of controlling the odour coming out from the plant;
- Check for automatic safeguards on machinery to prevent accidental injury;
- Check that wages and working hours are consistent with the average for the sector and national standards;

- 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 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.
- 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.
- 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?

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 and 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 and safety accidents;
- Management review/demonstrated involvement in environment, health and safety management.

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