Guidelines for Abattoir (Slaughterhouse or Meat Plant)

Acknowledgement:

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Executive Chief of the Egyptian Health Council: Prof. Dr Mohamed Mustafa Lotief.
Head of the Committee: Prof. Dr Ahmed M Byomi
The Decision of the Committee: Prof. Dr Mohamed Mohamady Ghanem.
Scientific Group Members: Prof. Dr Nabil Yassien, Prof. Dr Ashraf Aldesoky Shamaa, Prof. Dr Amany Abbas, Prof. Dr Dalia Mansour, Dr Essam Sobhy
Editor: Prof. Dr Nabil Yassien

Scope:

This part deals with the requirements needed to correctly design an abattoir with a brief about different types, systems, and compartments that whether are essential to be available or not.

Objective:

Understand and acquire comprehensive knowledge about abattoir design, types, and the necessity of its different compartments.

Definition of abattoir:

It is the only specialized official place in which food animals should be slaughtered, inspected, and prepared for direct human consumption.

Types of abattoirs:

1. Central abattoirs (Traditional, modern automatic and factory abattoir)
2. Inspection districts
3. Slaughter halls (Private)

Essential requirements for abattoir:

1. Careful consideration must be given to the size of the site, with allowance for various buildings and traffic circulation. Abattoirs can be classified into 3 categories according to area size: small (1-2 acres/ 30000 animal), medium (2-4 acres/ 50000 animal) and large (4-6 acres, 100000 animal).
2. The site should be far away from inhabited center to avoid complaints about noise and smell, near to animal markets and railway stations, near to water, electricity, and sewerage supply and constructed in a way that allows possible expansions.

3. Water must be potable and distributed to all parts of the abattoir under adequate pressure (20 PSI) & adequate supply of hot (not less than 82C°) and cold potable water for cleaning of the equipment. The recommended water requirement is 454 L/day, 272 L/day, and 45 L/day for pig, bovine, and sheep, respectively.
4. Three-phase electricity should be supplied and a stand-by generator.
5. An adequate natural or artificial lighting must be provided throughout the abattoir. The type of lighting must not distort colors. It is generally recommended that the overall intensity should not be less than 540, 220 lux and 110 lux in inspection points, work rooms and other areas, respectively. These intensities of light are usually taken at levels of 0.9 m. from the floor, except in the inspection areas where the height is 1.5 m.
6. Adequate ventilation must be provided to prevent accumulation of odors, dust, and excessive heat, but it should not cause draughts and thus problems for staff. Windows and open ventilators should be screened.
7. **Construction:**
    a. The floors should be hard, non-slippery, impervious, non-toxic, easily cleaned, and disinfected, easily drained and covered at wall junctions of the floor of the slaughter halls, lairage, work and chill rooms.
    b. The walls should be faced with a smooth, durable, impermeable material and covered by glazed tiles to a height not less than 3 meters from the floor and preferably reaching the ceiling, which should also be smooth, hard, and impervious to be easily cleaned and disinfected.
    c. The roof should be designed to provide adequate ventilation and light.
    d. The drainage system in the traditional abattoir floor must be sloped to the direction of the gutters and non-covered. While in modern abattoir rapid elimination of waste material and water must be carried out by transferring them to the effluent treatment unit to ensure maximum prevention of environmental pollution.
    e. The doors should be wide enough to allow passage of personnel, carcasses, and offal without contact with doorway with a width of 1.37m. It must be constructed of rust resistant material. If the doors are made of wood, they should be covered with rust-resistant smooth impermeable material.

Main compartments of the abattoir

1. Qarantine (Lairage)

- The Lairage is designed for reception of living animals. It is used for performance of ante-mortem inspection and pre-slaughter rest (12- 24 hr.) before slaughtering and segregation of animals exposed to infection.

- It should be built far away from the slaughter halls, roofed to protect animals and staff, and has reinforced concrete divisions with iron gates built in each lairage. Water troughs or bowls and hay rack must be provided.
- Every species of food animal must have a separate lairage with the following pen size for housing of livestock: cattle (loose) 2.3-2.8m, cattle (tied) 3.3m, calves and sheep 0.7m.

2. Slaughter halls

- Every species of animal must have separate slaughter halls. Slaughtering, dressing, and post-mortem inspection take place in slaughter halls.
- There are two main types of slaughter halls which are traditional or old-fashioned slaughter halls and modern automatic slaughter halls.
- At the traditional slaughter hall, the slaughtering, dressing, splitting and inspection of carcasses and organs have been done while animal carcasses are being hung in the same place or on the floor, which is considered unhygienic.
- While at modern automatic slaughter halls the carcass is conveyed by gravity or power along an overhead rail, after bleeding. The process of dressing is divided up into various stages, each undertaken by a separate operator. A combination of several machines, tools, and equipment. The dressing line system consists of clean and unclean areas where slaughtering, dressing, splitting are performed in the unclean area, while washing, inspection, cooling and dispatching in the clean area. The production rate may be as high as 5000, 10,000, and 3500 Cattle, sheep and pigs every 10 hours, respectively.
- There are four main types of line dressing which are gravity rail system (10-40 cattle/hour), intermittent powered system (10-75 cattle/hour), continuous powered system (40-120 cattle/hour) and canpak system 50-150 cattle/hour.
    1. Gravity rail system is used for lower slaughter rates with dressing occurs while hanging and moving through gravity.
    2. Intermittent power system can be used for higher rates of slaughter than gravity rail system and the carcass suspended on spreader and trolley a long a level rail at intervals by means of a variable timing device which can be pre-set to suit the slaughter rate.
    3. Continuous-power system is a continuous system and is used for higher rates of slaughter.
    4. Canpak system where the carcass can be revolved 360 degrees while being on the rail, allowing the operator to work all sides from one position.

3. Emergency slaughter room or Sanitary slaughter unite (Isolation block)

- It is a very small abattoir consists of lairage for 4 cattle, slaughter hall, detained meat room for keeping the carcass until the results of laboratory examination and it should be situated near to the lairage and by-product unit to get rid of dead animals from lairage into render plant.
- If there is no isolation block in the abattoir, suspected and diseased animals should be isolated and slaughtered at the end of slaughtering of healthy animals to avoid cross infection and contamination.

4. Condemned meat room

- For keeping the carcass and organs unfit for consumption and then taken either into render plant (By-products unit) or general incinerator (Outside town).

5. Detained meat room

- For keeping carcass and organs required further examination at refrigeration temperature (-1ºC to +4ºC).

6. Chilling room

- For keeping carcasses fit for human consumption until dispatching at a temperature range from -1ºC to +4ºC and the relative humidity 85%.
- The carcass must be hung in such a way as to allow free movement of cold air around them, rail spacing should be 0.9 m for beef, 0.7m for pigs and 0.5 m for lambs with a minimum space between carcasses on the rail should be 0.3-0.4m.
- It is vital that chill or freezer doors be closed fitting, and be provided with an internal opening device to prevent personnel being closed in the rooms and temperature to be checked on a continuous basis using charts or computer-generated records.

7. Veterinary Laboratory

- A well-equipped laboratory is essential for diagnosis and confirmation of suspicious cases as well as for maintaining the overall hygiene standards.
- A small laboratory for trichinella examination should fit, connected with pig slaughter halls.

8. **Accessory compartments**

a. Hide and skin store

Hides and skin of slaughtered animals should be transferred directly after skinning either mechanically or manually to this store where they are prepared and stored.

b. Gut and tripe room

For emptying & cleaning of the stomach and intestines.

c. Red offal room

Edible offal such as liver, kidneys and lungs should be trimmed and placed in a chill or freezing room. Edible offal's must be held at a temperature not exceeding 3ºC **.**

d. The edible fat room

This is a separate holding room, usually located near the gut room and where edible fat is held.

e. Cutting room

During the cutting process, the temperature of the building must be not exceed 10ºC (internal temperature of meat not more than 7ºC). Adequate facilities are necessary in the form of suitable equipment, hot water, potable water to keep the whole area hygienic and waste disposal system that meets hygienic requirements.

f. Inedible area

Materials unfit for human consumption except for hide and skin should be sited away from the edible areas, since improper handling of these organs can result in unhygienic conditions.

g. Fresh meat dispatch area

The fresh meat dispatch area must be located away from the dirty part of the abattoir and easily reached by vehicles associated transport of meat and offal for human consumption.

h. Facilities for personal

Enough water closets for both sexes are employed, with showers and washing hand basins must be provided (one for every 15 employees). A Laundry and car park are necessary for modern abattoir.

i. Veterinary office

An adequately equipped lockable room for the use of the veterinary service and a larger one for the meat inspectors. The rooms provided with hand washing and showers facilities. A convenient means of cleaning footwear before entry into changing rooms is an advantage.

j. Manure bay

This should be located near the lairages on the dirty side of the abattoir. Its floor and sides should be impervious, with provision made for overflow liquors to be drained

k. Vehicle washing

The cleaning of meat and animal transport vehicles is usually neglected, so the former should be done in the clean side of the abattoir with high pressure hot water and detergent with a good drainage for vehicles and wash area.

l. Freezing room

For keeping the carcass that requires special treatment.e.g. light infestation with *C. bovis*

m. By- product unit

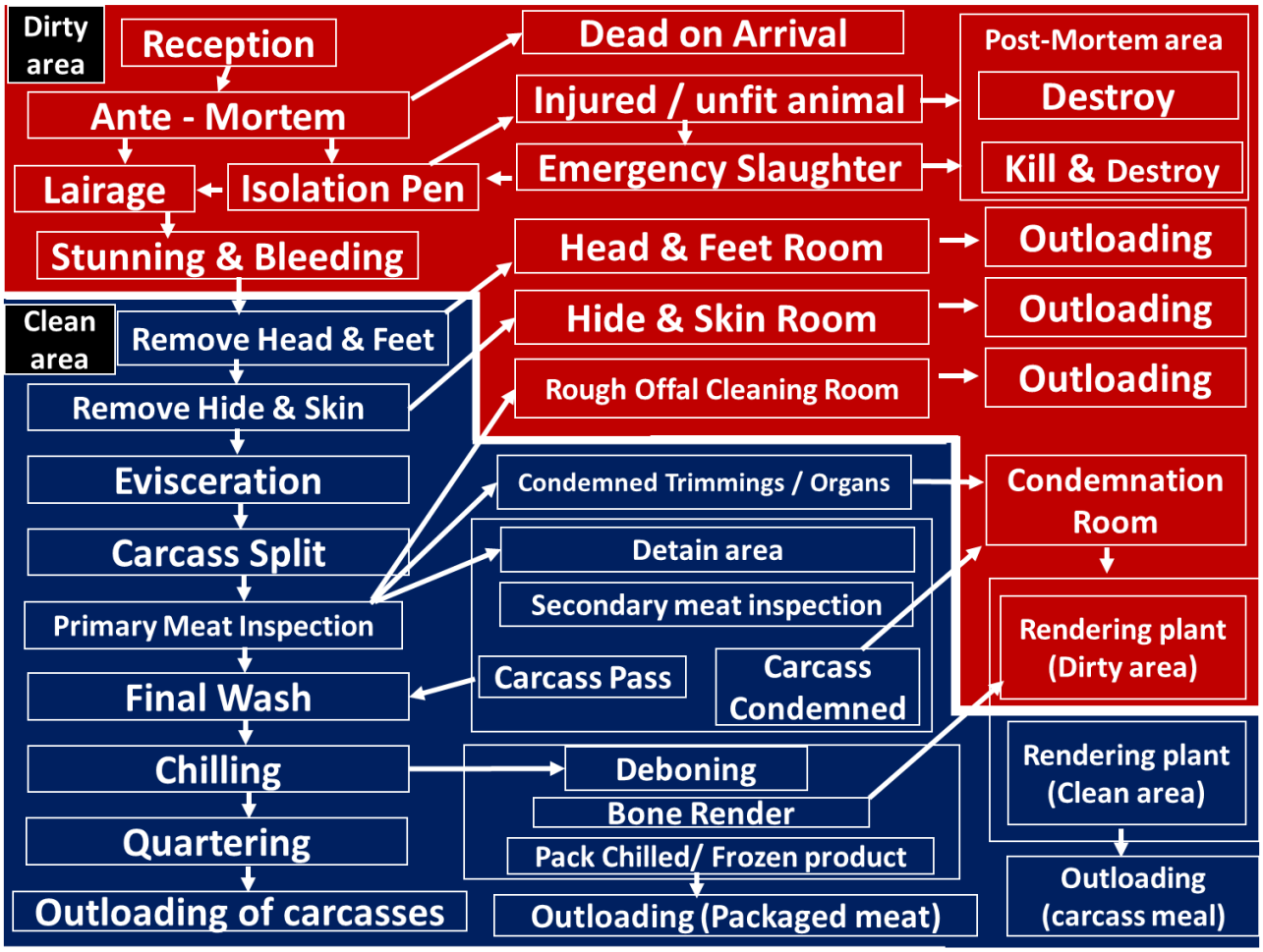
By-product unit is used for further processing of all materials which are unfit for human consumption.

Slaughter Hall

RED MEAT

ABATTOIR

Flow diagram for red meat abattoir



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