ABATTOIR WASTE DISPOSAL

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The term 'livestock wastes' may mean any one of the following such as excreta including solid and liquid portions, total excreta including the bedding provided to the animal, the materials left after the drainage of the liquid portion, only the liquid which have been allowed to drain from the total excrement. The waste arising in an abattoir include the excrete of the animals, the contents inside the gastrointestinal tract fully and partially digested, the blood and the waste water from cleaning and watering. The waste depending on its physical characteristics can be broadly classified as solid waste and liquid waste. The accumulation of waste in communities constitute a health hazard because

1). The organic part of the refuse ferments and favours fly breeding.

2). The garbage in the refuse attracts rats.

3). The pathogens are conveyed to man through flies and dust.

4). Piles of refuse are a nuisance from an aesthetic point of view.

Therefore there should be efficient collection, removal and disposal of refuse without the risk to health. For the sake of convenience the disposal of solid waste and liquid wastes may be taken up separately.

Solid waste

Solid waste arising in an abattoir has high moisture content. Bulk of the waste will be contents of gastro intestinal tract. The animal contents are mostly fibre. The contents of other chambers of stomach will be partly digested and that of intestine almost digested. The solid waste is to be collected frequently and disposed to avoid the hazards arising from accumulation of the wastes in the premises of the slaughter house. The methods of refusal of solid wastes are many. The choice of the method depends on the cost, availability of land and labour. Some of the methods of disposal are discussed below.

1. Dumping

The refuse is collected from the source and dumped in the low lying areas partly as a method of reclamation of land but mainly as an easy method of disposal of dry refuse. As a result of bacterial action refuse decreases considerably in volume and is converted gradually into humans. The reclaimed land is later used for construction of buildings as residential or commercial area. The drawbacks of indiscriminate dumping are

1. The solid wastes are exposed to flies and rodents.
2. It is a source of nuisance from the small and unsightly appearance.
3. Drainage from dumps contributes towards pollution of surface and ground water.

2. Controlled tapping (Sanitary land fill)

This is a satisfactory method of disposal of solid was when suitable land is available. This differs from ordinary dumping in that the material is placed in a trench or other prepared area adequately compacted and carried with earth at the end of the working day. Compaction and covering of the solid waste is accomplished once or twice in a week. The controlled tapping can be done either by ramp method or by trench method. Where level ground is available the trench method is adopted. The measurement of the trench is depth 2 -3 metres, width 3 - 10 metres depending on local conditions. The refuse is compacted and covered with excavated earth. The ramp method is well suited where the terrus is moderately slopping. Some excavation is done to secure the covering material. The area method is used for filling land depressions, clay pits etc. The solid waste is deposited, packed and consolidated in uniform layers upto 2 to 2.5 meters deep. Each layer is resealed on its exposed surface with a mud cover at least 30 cm thick. This sealing prevents infestation by files and suppress foul smell.

Chemical, bacteriological and physical changes occur in buried refuse. The temperature uses to over 600C in 7days and kills all the pathogens and hastens the decomposition process. Normally it takes 4 to 6 months for complete decomposition of organic matter into a innocuous mass.

Incineration

Incineration is a hygienic way of disposal of sloid wastes. This method is adopted when suitable land is not available for buriel or controlled tipping. As the moisture content of slaughter house solid waste is very high, incineration involves heavy outlay of expenditure besides manipulative difficulties in the incinerator. Hence this method is not recommended. Incineration a major source of air pollution as well.

Composting:

Composting is a method of combined disposal of solid wastes and night or sludge. It is process of nature whereby organic matter breaks down under bacterial actions resulting in the formation of a relatively stable humans like material, called compost which has considerable manorial value for the soil. The heat produced during composting 600C or higher for several days destroys eggs and larvae of flies and pathogenic agents. Method of composting are:

1. Hot fermentation methods
2. Mechanical composting

In Hot fermentation method trenches are dug as follows:

Length ←——4.5 to 10 metres

Width ←——1.5 to 2.5 metres

Depth ←——0.9 meter

The lenght can vary depending on the bulk of the solid waste to be disposed. The depth should not be more than 90 cm. As it may lead to slow decomposition. The location should not be close to human developing area. The composting procedure is as follows. First layer of solid waste at about 15 cm thick is spread at the bottom of the trench. Over this night soil or cowdung is added to a thickness of 5 cm. There after alternate layers of solid waste and night soil or dung are added in the proportion of 15 cm and 5 cm respectively. Till the heap rises to 30 cm above the ground level. The top most layer should be solid refuse at least 25 cm in thickness. The heap is covered with excavated soil. Within 7 days as a result of bacterial action considerable heat (over 600C) is generated in the compost mass and the heat persists for 2 to 3 weeks. The heat serves to decompose the content in the pit and to destroy all parasitic and pathogenic organisms present in it. By the end of 4 to 6 months the decomposition is complete and the resulting manure is a well decomposed odourless, innocuous material of high manorial value ready for collection from the pit and application on the land.

In some of the developed countries instead of pit composting Mechanical composting is being practiced. In this compost is literally manufactured on a large scale by processing raw materials and turning our a finished product. Before the process the materials which are likely to interfere with grinding operation are removed. It is then pulverized in the pulverizing equipment in order to induce the size of the particles to less than 5 cm. The pulverized refuse is then mixed with sewage, sludge, night soil or dung in a rotating machine and incubated. The factors which are controlled in the operation are certain carbon - nitrogen ratio, temperature moisture, pH and aeration. The entire is followed in some developed countries.

Manure pits

The solid wastes, cattle dung, left over straw and dry leaves are dumped in the manure pit. Ideally there should be two pits. After the first one is filled it is closed for 4-6 months time to allow the contents to degenerate to form the manure. In the mean time the second pit can be used. The size of the manure pit depends on the bulk of the waste to be collected and disposed. This is a simple and economic method of refuse diposal.

Liquid Waste Disposal

The liquid waste originated from an abattoir consists of urine, blood, liquid from the gastro intestinal tract and wash water from the slaughter halls. If the public sewer system is well developed it can be directed to the sewage which in turn will be treated before they are finally disposed. The BOD of the liq waste depends on the proportion of organic matter incorpora in it. If the slaughter house bye-products like blood are collec for better utilization, the organic content in the liquid waste v be less. The quality and quantity of water used in the abat also influence the strength of the waste liquid arising.

The composition of the liquid waste vary with the quan and nature of solid materials present in it. The aver composition is water 99.9% and solids 0.1%. The offens swell of effluent is due to the organic matter present. Accordi to the law of nature the organic matter undergo decompositi The strength of the effluent is expressed in terms (a) T Biological oxygen demand (BOD) and (b) The measure suspended solids.

The effluent is treated before it is let out to the water sourc The aim of the effluent treatment is to stabilize the orga matter and to produce an ecofriendly, pathogen free efflu from meat plants. The modern effluent treatment is based the biological principals and with the help of bacterial belongi to both aerobic and anaerobic groups. The treatment is broa divided into two stages, the primary treatment and second treatment. In primary treatment the solids are separated fr the effluent partly by screening for removing the solids havi the size more than 5 cm. The grit chamber is for removal heavier solids like sand and gravel.

During the treatment in the primary sedimentation tank, effluent is made to move very slowly across the tank at a very l velocity, for about 6 to 8 hrs. During the long period relatively still condition in the tank considerable purificati takes place mainly through sedimentation of suspended matt More than 50 percent of solids settles down and 30-40 perce reduction in coliform also takes place. The settled down orga matter is known as sludge. This is mechanically removed. T bacteria will attack complex organic solids and break down simple soluble substances and ammonia.

In secondary treatment, the out coming that has undergo primary treatment is subjected to treatment by aerob oxidation. It is achieved either by trickling filter or activat sludge process. Trickling filter or percolating filter is a bed crushed stones 1 to 2 meter deep and with 2 to 30 meters diameter. The effluent from the primary sedimentation tank sprinkled uniformly on the surface of the bed by a revolvi device consisting of hollow pipes having rows of holes. The pi keeps rotating sprinkling the effluent in a thin filter and complex biological growth consisting of alage, fungi, protoz and bacteria of many kinds occurs. This is known as zoogl layer. As the effluent percolates through filter beds, it g oxidized by the bacterial flora in the zooglear layer. This is ve efficient method of effluent treatment.

The activated sludge process is the modern method purifying sewage. The activated sludge is a rich culture aerobic bacteria made by aerating sewage for a long period. It

mixed with incoming effluent at the rate of 25 percent of sludge and the mixture is aerated in an aeration chamber for about six hours. The aeration is accomplished either by mechanical agitation or by forcing compressed air continuously from the bottom of the aeration chamber. During the processing aeration the organic matter of the sewage get oxidized into CO2 nitrate and water. This method is ten times more efficient than trickling filter.

In the secondary treatment the oxidized sewage from the trickling filter of aeration chamber is led to the secondary sedimentation tank where it is detained for 21/2 hours. The slurry that settles down is known as activated sludge or aerated sludge. It is rich source of bacteria, nitrogen and phosphate and it is a valuable manure. A part of this is pumped back into the aeration chamber and the remaining to the slurry digestion tank for treatment and disposal. The effluent is disposed by dilution into water courses like river or stream. The diluting capacity of water and its dissolved oxygen content is important. The effluent is to be rendered pathogen free before disposal by chlorination. It should not have suspended matter more than 30 mg/litre and its BOD should be within 20 mg/litre. The body of the water itno which the effluent is passed would provide an 8 : 1 dilution.

Oxidation pond

In the absence of a well developed sewer system, it is necessary to resort to other methods of disposal of liquid waste from slaughter houses. Oxidation pond is one of the accepted methods. It is also known as waste stabilization pond or Redox pond. This is possible only when open area is available in the vicinity. It is an open shallow pool 1 to 1.5 m deep with an inlet and an outlet. The pond works on the principle of photosynthesis and discharging of O2. in the process. There will be growth of bacteria and its multiplication utilizing O2 and the bacteria act on oganic matter in the waste water and producing CO2. The pool will have water plants like algae growing in that. On oxidation of organic matter by bacteria simple chemical components such as CO2, H2O and inorganic minerals for their growth. Thus there is mutually beneficial biological balance between algae and bacterial in oxidation pond. The O2 needed for oxidation is partly derived from atmosphere but mostly liberated by algae during photosynthesis. Therefore sunlight is essential for the working of oxidation pond. It is predominantly aerobic during sunshine and for few hours at night. The remaining hours of night, the bottom layers are generally anaerobic. The effluents may be used for vegetable cultivation or discharged into water course after treatment.

Other Methods of Liquid Waste Disposal

In the absence of facilities for oxidation pond or public sewage system, the liquid waste from the abattoir has to be disposed by other methods. The septic tank could be utilized for this purpose. The capacity of the tank should be large enough to accommodate the waste water evolved. The septic tank is a water - tight masonry tank into which the waste water is admitted for treatment. It may be single chambered or multichambered.

The working of a septic tank is based on the principle that the solids will settle down to form sludge and the lighter solids form the sucss. The solids are attacked by aerobic bacteria and fungi and are broken down into simple chemical compounds. This is the first stage known as anaerobic digestion. Due to the anaerobic digestion sludge volume is considerably reduced.

A portion of the solids is converted into liquids and gases which rises to the surface in the form of bubbles. The effluent is allowed to percolate into the sub soil, by means of perforated or open joined pipes laid in trenches, that are covered with soil. The organic matter dispersed with effluent is attacked by bacteria in the soil and are oxidized into stable end products. This stage is known as aerobic oxidation.

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