

SAFE AND HYGIENIC DISPOSAL AND DRY RENDERING OF DEAD ANIMALS AND ANIMAL WASTES

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Environmental sanitation has an important role in the control of zoonoses and related food-borne diseases, as the environment could be a permanent reservoir and source of diseases. This matter has been neglected by many of the countries, especially the developing countries like India. On the one hand, the role of dead animals and animal wastes in the spread of human diseases has not been sufficiently appreciated and on the other hand the administrative and legislative provisions for inter-professional collaboration for preventive measures have been inadequate. In addition, money, manpower and other facilities for hygienic disposal of dead animals and their rendering are still insufficient in India. Successful environmental sanitation is an indispensable part of zoonoses, animal diseases and related food-borne diseases control and in the promotion of safe food and water supply, proper nutrition, basic sanitation, etc.

Development of livestock and poultry production, meat and meat product processing, milk and milk product processing have increased hazardous materials, which require decontamination/sterilization. Animal tissues that may be rendered are rich in protein, fat and therefore, should be preferably be recycled. The rendered materials can be used as animal feed components or into products that have agriculture, industrial or even pharmaceutical value. Therefore, the rendering process is an economically profitable enterprise and this involves sterilization step. Incineration is not at all a panacea for animal waste treatment/ disposal as that it self can increase green house effect and public nuisance.

Definitions

Dead animal: A cadaver of an animal that has died of natural causes or diseases or was killed for purposes other than human or animal consumption.

Slaughter offals: Any edible or inedible part of the animal other than the carcass.

Carcass: Body of slaughtered food animals after stunning, bleeding and dressing in an abattoir.

Animal waste: Materials of animal origin with risks for contamination of the environment or spreading of infectious diseases, other than dead animals, slaughter offals and excreta such as urine, slurry or manure.

Rendering: Processing of animal cadavers, slaughter offals and animal wastes into harmless and useful products, in general,

animal feed components.

Rendering with sterilization: Rendering with elimination of all microorganisms, including bacterial spores, in high pressure cooking.

Rendering without sterilization: Rendering without complete elimination of all microorganisms, consisting of cooking, drying or acidification. This is only for low risk materials.

Low risk material: Materials for rendering without hazards for spreading human or animal diseases (slaughter offals from healthy approved slaughter animals).

High-risk materials: Materials for rendering or destruction with suspected or demonstrated serious hazards for spreading human or animal diseases. (materials from animals died or were killed in the course of notifiable and infectious diseases like anthrax, brucellosis, leptospirosis, FMD, RP, rabies, CBPP, CCPP, TB, etc.)

Destruction: Total elimination of high risk or other materials by incineration or burying without the possibility of recycling of useful products.

Decontamination: Reduction of the number of microorganisms to a level where they do not present a hazard to human or animal health or complete elimination of them in or on a given material (rendering and destruction).

Disinfection: Decontamination of specific environmental objects like utensils, equipments and working surfaces.

Condemned material: Slaughter animals or meat that has been inspected or judged as unfit for human consumption.

Materials For Decontamination And Rendering

Animals that died on the farm, including stillborn animals, placenta, offals from hatcheries, animals that have been killed in campaigns to eradicate epizootics, inedible offals from slaughter houses and poultry processing plants, intestinal contents such as rumen ingesta, condemned carcasses or condemned parts of carcasses, trimmings, fleshings, floor sweepings, sieve remaining and fat from wastewater sludge from abattoir effluent plants, condemned fish and fish offals, spoiled meat and meat products and other spoiled foods, leftover food from restaurants, food industries, catering establishments, etc., cadavers of pests, stray animals and sport animals, cadavers of lab animal after completion of experiment, animals slaughtered for partial use (fur animals, shark, shrimp, prawns, lobsters, crocodiles, etc.)

remains from leather industry, remains of animal materials sent for examinations to veterinary institutes, food laboratories, etc.

Some materials intended for rendering could also be used for other purposes. *The materials that may be exempted from the decontamination process are:*

Bones-ceramic purposes, bone meal, gelatin, glue, etc., hoofs and horns- buttons, combs, neat's-foot oil, etc., hair- for bedding, brushes, etc., feathers- for bedding, quilt, sports goods, etc., rumen contents- fertilizer, fodder for poultry, etc., intestines- casings, catgut, sports guts, etc., unhygienically collected blood- production of hemin, glue, etc.

Physical and chemical pollution may occur when materials are mixed with plastics, metals, or pesticides (naturally or experimentally). Such dead animals or other materials derived from them neither should preferably nor be rendered but destroyed in such a way, which will disintegrate all hazardous materials. Destruction is by incineration. Radioactive materials should not be disposed of by burning. The materials for rendering could be divided into low and high-risk materials.

Handling Of Low Risk Materials (LRM)

The low risk materials for dry rendering should be handled without posing risk for man, animals and environment. Contact with these materials should be minimized. The different stages of processing include: 1) keeping until collection, 2) collection and transport, 3) decontamination process and 4) handling of decontaminated materials.

Keeping Until Collection

The materials for rendering should be isolated from surroundings and should be kept in a cool dry place away from vermin and pests. Contamination of water, air and surfaces should be prevented. Storage place should be separated from animal premises, populated areas or food processing industries and abattoirs. Dead animals from the farm should be taken away from other animals as soon as possible. Cadavers should be stored in watertight containers. The flaying of dead or condemned animals should be forbidden. Handle the materials with disposable gloves only. Suspected cases of animal death, abortion, etc., should be examined by a veterinarian to exclude high risk infection. The place of storage of the LRM should be accessible to vehicles.

Collection and Transport

The collection and transport of LRM for rendering or destruction should be carried out in closed, watertight containers that can be easily cleaned and disinfected. The materials should be collected without deterioration as soon as collected. The vehicle used for the transport of LRM should be solely for that purpose. The materials are loaded mechanically so that possible contamination of humans, soil, roads or the exterior of the lorries is avoided. Mechanical unloading in closed halls would avoid contamination. Storage sites, collection points, containers,

silos, tanks and vehicles used for animal materials should be cleaned and disinfected regularly, preferably daily.

Decontamination

The materials are decontaminated as soon as possible to prevent microbial putrefaction, which would otherwise decrease the quality of the final products. Prevent cross-contamination with the raw materials. Separate the clean area and the unclean area. Decontamination, with or without sterilization or destruction should be carried out under veterinary supervision, especially microbiological quality of the end product.

Handling of decontaminated materials

Store the decontaminated material in the clean area in a cool, dry place without cross-contamination with the raw materials and away from pests and vermin.

Handling Of High Risk Materials (HRM)

HRM are animals or parts of animals that have died of infectious diseases or that were killed in epizootics. Handling should be kept to an absolute minimum.

Isolation of materials on the Spot

The animals died of infectious diseases should be immediately isolated and their excreta should be disinfected. Isolate the spot from the surrounding environment. Prevent drainage by rain or surface water. Keep the dead animals in a dry place covered by a plastic or other impervious material. The judgement regarding the method of disposal and treatment is made after veterinary inspection.

Veterinary Inspection

The antemortem and postmortem inspections and laboratory tests should be conducted prior to taking appropriate measures. If laboratory confirmation is not obtained in a short period of time, the suspected case should be treated as high-risk material. According to the result of examination, the veterinary authorities should take decision on the method of destruction, the mode of transportation and the protective measures. Relevant data should be reported to the national and international authorities for the prevention and control of zoonotic and animal diseases.

Preventive veterinary measures include 1) prohibition to transport any other animal of the same flock or herd or from the same region as the infected animals, 2) eventual vaccination of susceptible animals in the same region, 3) special transportation of the dead and the diseased animals and 4) prohibition to slaughter animals from the same region for a fixed period of time. Prevent the spread of zoonotic diseases.

Transport

Cadavers from different locations should not be collected together except in cases of epizootics, death due to natural calamities, etc. On loading by mechanical means, care should be

taken to protect people involved in handling infective materials and to prevent environmental contamination. Take all safety precautions during construction, cleaning and disinfection of the transport vehicle.

Destruction

The rendering plant and their environment could create public and animal health problems. The introduction of pathogens into soil and air and their transmission by vectors are important factors in the spread of zoonotic diseases from the rendering plants. Pathogens from the unclean areas contaminate different objects and they can survive for long periods of time in the environment.

In the case of very dangerous zoonotic and animal infectious diseases like anthrax, the dirt and other materials should be removed by mechanical means and incinerating them. No water should be used in cleaning to prevent the spread of pathogens. Animals dead on arrival should not be unloaded in the lairage. Dead animals in the lairage should not be dragged. In the case of anthrax, the natural orifices should be closed with tampons impregnated with disinfectants to stop the flow of blood. Soak

the blood from the floor with soil, saw dust or humus and destroy by incineration. The carcasses and other offals that have come in contact with anthrax carcass should also be condemned and incinerated. Disinfectants in anthrax: NaOH 10%, HCHO solution 4%, chlorine containing compounds (5% active chlorine), hydrogen peroxide solution 7%, gluteraldehyde sol 2%. Soil could be disinfected by gluteraldehyde or formaldehyde solutions.

Disinfection of surfaces in the unclean section: chlorine containing disinfectant solutions (3% active chlorine), NaOH sol 4% (70-80C), HCHO SOL 2%, sodium Carbonate sol 4-5% (80C). Materials such as plastic sheets or wooden boards may be burned rather than disinfecting. Open flame burning disinfection may be employed for treatment of infected concrete floors, pavements, iron equipments or tools.

Prophylactic disinfection, at least once a month, should be carried out in the clean section. NaOH 2.5%, HCHO 2%, sodium carbonate solution 2-4% (hot).

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Q. What are the other responsibilities of food microbiologist in the future?

Ans: The main responsibility is as always, towards the protection of public health. This is by providing the expertise to industry as well as to the Government regulatory bodies. But in the new scenario of open trade, we have additional responsibilities. Globalisation is always discussed upon by focusing on improvement of our indigenous meat quality for export. But the problem of profit seeking multinationals dumping substandard meat into our country is always overlooked. This needs to be addressed immediately and for this reason also; we should establish meat microbial standards in our Country. The quest for excellence is a never-ending process in science and the work of food microbiologist is no different.

(For specific questions, please contact
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Further reading:

1. Gram L, Soggard H (1985) A rapid method for estimation of bacterial levels in ground meat. J. Food. Protect. 48: 341-345
2. Muthukumar, M and Rao K.H., (2003). Recent advances in assessment of microbial quality of meat Indian Food Industry Vol22, No:4 pp 49-52
3. Rangel P, (1999) Rapid food analysis and hygiene monitoring Springer publishers, New York.
4. Siragasa GR, Cutter CN (1995) Microbial ATP bioluminescence as a means to detect contamination of artificially contaminated carcass tissue. J. Food. Protect. 58: 764-769.

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agents. Concentration used is 200-1200 mg/ltr. Due to their surface setting, washing with clean water is required.

(d) Surfactants

They are amphoteric surface active substance having low toxicity, little corrosive action and cleaning and bactericidal activity. They are inactivated by organic matter.

(e) Strong acids and alkalis

They should be handled with care and may contaminate meat.

In addition, use of CO2 pellets is gaining popularity in food industry by virtue of their ability to expand and the abrasive action on deposits.

HYGIENE MONITORING

Traditionally monitoring is by contact culture of surfaces of utensils and machines requiring 2-3 days for the results. Rapid methods (2-3 minutes) such as ATP-Bioluminescence assay are gaining acceptance in food industry world over for monitoring the hygiene.

To summaries, sanitation management and hygiene monitoring in a slaughter house are two essential processes for developing a clean product, in a clean environment.