A Monthly e Magazine
ISSN:2583-2212
May 2024 Vol.4(5), 1942-1945

Popular Article

Management of biomedical and livestock waste generated by animals

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https://doi.org/10.5281/zenodo.11420823

Biomedical waste (BMW) refers to any waste produced during the process of diagnosis, treatment, immunization of humans or animals, or research activities that contribute to biological production or testing. One of India's notable accomplishments has been the incorporation of waste management into routine healthcare operations, thanks to a shift in health operators' attitudes towards waste management, as noted by Bekir Onursal in 2003.

Classification of Biological Wastes

1. **Non–Hazardous Wastes**

In most of the setups of health–care approximately 85% of the generated waste is constituted by non–hazardous wastes. This includes wastes constituting remnants of food and peels of fruit; wash water as well as paper cartons; packaging materials etc. (Hegde et al., 2007)

2. Hazardous Wastes

Potentially Infectious Wastes

Hazardous waste includes infectious as well as infectious; medical and biomedical; hazardous and red bag; contaminated; infectious medical wastes; along regulated wastes in the medical profession. All these terms indicate similar types of waste even though the terms involved in regulation are usually defined in a more specific manner (Block, 2001).

Biomedical Waste Management (BMW) Rules and Schedules

Biomedical waste disposal is a legal issue. In 1998 Biomedical Waste Management & Handling Rules (1998) came into power in India. In agreement with such rules, it is the responsibility of each "inhabitant" to take all necessary steps to make certain that generated waste is managed/handled without any unfavorable human health effects as well as safeguarding environmental aspects. Six schedules are included viz. schedule I–VI. Schedule I consists of 10 categories of biomedical waste. Category 1 consists of wastes in human anatomy that include body parts as well as organs and body tissues. Category 2 consists of wastes from animals that include parts of carcasses and bleeding along with fluids and blood; animals kept for experimentation; hospital (both medical and veterinary) and animal house-generated wastes. Category 3 consists of microbiological and biotechnological wastes from laboratory cultures; stocks or microbes; vaccines (live attenuated); human and animal cell cultures used for research activities; toxins; wastes from biological products; and cell culture transferring dishes and devices. Category 4 consists of sharp wastes starting from needles and syringes to blades and glasses for puncturing and cutting. Category 5 consists of medicines and cytotoxic drugs that are discarded as they are backdated and contaminated. Category 6 consists of wastes that are soiled and include blood and body-fluid-contaminated wastes (cotton and dressings; plaster casts, lines, and beddings that are soiled). Category 7 includes solid wastes produced from items that are disposable but not sharps (tubing, catheters, and intra–venous sets). Category 8 consists of liquid materials viz., laboratory and washing generated wastes; during cleaning; and those generated from activities of housekeeping and disinfection procedures. Category 9 includes ashes that are incinerated. Category 10 consists of wastes generated during biological production along with those for disinfection (chemical wastes). Schedule II consists of coding of color and type of container used for the management of biomedical waste. Schedule III comprises Biomedical Waste Containers'/Bags' labels. Lastly, Schedule IV consists of Biomedical Waste Containers/Bags and labels required for transportation.

Treatment and Disposal Methods

The basic principle involved in the treatment of biological wastes is that mutilation or shredding must be able to prevent unauthorized reuse. In the simplest form,a 1 percent solution of hypochlorite is used for chemical treatment. On the other hand,the incineration procedure does not involve any pre-treatment. The procedure of deep burial is required in towns only wherein the population of humans is less than 5 lakhs (www.hercenter.org; www.mppcb.nic.in). Treatment of wastes moreover should be done as near to the point of origin as much as possible (http://www. chemsoc.org/ networks/gcn/ industry.htm). Keeping all these points in mind the treatment and disposal methods of various kinds of waste must be carried out cautiously and appropriately

Animal carcasses and body parts – Incineration, digestion, or landfill.

a) Animal waste (Biohazardous): Thermal or chemical treatment for incineration and disinfection.
b) Animal waste (Non–hazardous): Using as compost or fertilizer.

Importance of livestock waste management

The most common concern with animal waste is that it affects the release of large quantities of CO2, and ammonia which might contribute to acid rain and the greenhouse effect. It could also pollute water sources and be instrumental in spreading infectious diseases. If the disposal of water is not properly planned it might create social tension owing to the release of odors and contamination of water sources to prevent pollution and the spreading of disease pathogens are required for efficient utilization and management of waste at large farms is essential. Proper management of livestock waste for society by the following means: -

1. Livestock manure helps to maintain soil fertility in soils lacking organic content. Adding manure to the soil increases the nutrient retention capacity, improves the soil's physical condition by increasing its water-holding capacity, and improves soil structure.
2. Animal manure also helps to create a better climate for microflora and fauna in soils.
3. Dung is also used as fuel.
4. Waste manure and other organic materials from livestock farms could be an important source of energy production.
5. Livestock waste can be used in resource management, in crop and livestock production, and in the reduction of post-harvest losses.
6. Livestock waste management plays an important role in the livelihoods of many rural dwellers in India.

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Published 25.05.2024

7. Bio-energy sources are increasingly gaining attention as a sustainable energy resource that may help to cope with challenges like, increasing demand for energy, and rising fuel prices by providing substitutions for expensive fossil fuels.
8. Biogas from livestock waste and residues provides renewable and environmentally friendly sources that support sustainable agriculture. Additionally, the by-products of the 'digesters' provide organic waste of superior quality.
9. Reduce sources of infection for animal and human populations.
10. Reduce the source of methane emission (0.28-1.95g/day).
11. Reducing fly nuisance.
12. Helps in proper nutrient management practices (reduce loss of organic matter).
13. Helps in controlling vectors and fomites.
14. Reduce environmental pollution.
15. Reduces illegal discharge of waste which can pose a direct threat to the quality of soil and water system.
16. Nitrogen in manure is tied up in its organic state until, through decomposition, it is converted to a soluble form (ammonium nitrate). When ammonium nitrate is mixed with soil it improves soil fertility.

Conclusion

Livestock production systems generate a significant amount of animal manure. Managing this manure as a resource can provide various benefits to livestock producers. Effective livestock waste management helps maintain soil fertility in areas with low organic content, improves the socio-economic status of developing countries, and reduces the risk of disease transmission from waste.

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Published 25.05.2024