



## SOLID WASTE MANAGEMENT BY VERMICOMPOSTING USING *EISENIA FOETIDA*

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### Abstract

Using vermicomposting to treat biodegradable waste from a local hospital, this study aimed to develop a more environmental friendly way. The earthworm *Eisenia foetida* was culturing using a mixture of cattle manure and hospital/agro/kitchen waste. Under the same conditions, researchers observed the growth and development of the epigeic earthworm *Eisenia foetida*. Goat manure had a higher content of total C and K than sheep manure. Adding gram bran to goat dung increased the number of *Eisenia foetida* earthworms, as well as their weight and length.

Keywords: Bio medical waste, *Eisenia foetida*, Animal dung, Kitchen waste, Agro-waste, vermicomposting.

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### Introduction

Waste is generated by all human and animal activity. We're all aware that this type of waste can be hazardous and should be disposed of properly. Waste from factories, sewage treatment plants, and farms contaminate the environment. People and the environment can be endangered as a result. Additionally, hospitals and other health care institutions generate a lot of trash that is very infectious, including HIV and hepatitis B and C.

Non-hazardous and bio-hazardous BMW are generated by hospitals, and both types can pose a risk to the public. Non-infected plastic, packing material, paper, etc. are examples of nonhazardous trash. Sharps, non-sharps, plastic disposables, and liquid waste are examples of infectious biohazard trash, as are radioactive materials such as thrown glass or discarded batteries. Other types of biohazard waste include chemical waste and cytotoxic waste burnt at the end of their useful lives. Though most of the BMW is safe for humans and animals, the remaining 10-25 percent is harmful to the environment and poses a health risk to those who come into contact with it. If BMWs are handled improperly, they could have serious health repercussions and a significant environmental impact. Biomedical waste includes the following items: Human anatomical waste, including organs, tissues, and bodily parts; Animal faeces created by veterinary hospitals during research; Biotechnology and microbiology wastes; Throw away needles and other sharps.

syringes, scalpels, needles, and broken glass; discarded medications and cytotoxic substances; soiled trash including bandages, plaster casts, blood, and dressings.

Any infected area's liquid waste ash and other chemical wastes from incineration

The hospital's biodegradable garbage can be composted on-site and utilised for gardening, as long as it's biodegradable. By using earthworms, vermicomposting is the most efficient method of dealing with garbage. Vermicompost is the result of an eco-biotechnological process that turns complex and energy-rich organic matter into a stable humus-like product. Vermicompost can store more nutrients for a longer amount of time without affecting the environment. Chemical fertiliser overuse depletes soil fertility and productivity. One of society's most pressing issues is how to properly dispose of animal, agricultural, and household trash. One of the most important sources for solving waste disposal issues has emerged from the epigeic earthworms. Soil and environmental quality can be improved by the proper usage of these wastes. Since it has a brief life cycle and can handle temperatures and humidity ranging from low to high, vermicomposting is ideal for *Eisenia foetida*. Researchers compared two types of livestock manure (sheep and goat dung) in conjunction with hospital, agro, and kitchen wastes by worms and their growth and development in the presence of these manure mixtures.

### Materials and Method

Locally collected kitchen and sanitary wastes from Aligarh's residential areas were used in the study. Various Aligarh-area farms provided fresh animal manure for analysis. Animal wastes are described in detail (Table -1). *Eisenia foetida* juveniles were randomly selected from a variety of laboratory

stock cultures. Drenched wastes were kept at 70-80 percent moisture content during the study period by spraying sufficient distilled water on the material. For 12 days, the waste mixtures were physically flipped over every day to remove the volatile chemicals. Storage of all containers took

place in the dark, at a constant 25° C (give or take a degree). Animal faeces was used as a standard. Efforts were made to combine wastes (ratio 1: 1). After a period of 12 days, each bed was introduced to a total of 18 adult *Eisenia foetida*.

There were three separate measurements of earthworms' length, weight, and total number: Whatman no-1 filter paper was used to measure the pH. Flame photometers were used to measure Total K.

Table -1: Initial Physico-Chemical Characteristics of Two Livestock Manures

Parameters	Sheep	Goat
pH ( 1 : 10 )	8.1	7.4
Moisture contents (%)	73.2	21.9
C : N ratio	88.6	93.4
TOC %	32.1	43.2
TK %	0.71	0.73

Table -2: *Eisenia foetida* growth and development as influenced by two animal manures and their combination with agricultural and domestic wastes:

MANURE	NUMBER	WEIGHT	LENGTH
Sheep dung	30.9 ± 0.61	783.41 ± 19.41	4.98 ± 0.26
Sheep Dung+ gram bran	70.4 ± 0.39	914.40 ± 16.30	6.10 ± 0.18
Sheep Dung +wheat bran	51.3 ± 0.94	820.00 ± 22.69	5.25 ± 0.08
Sheep Dung +vegetable wastes	42.3 ± 0.82	792.20 ± 25.98	4.10 ± 0.25
Goat dung	35.90 ± 0.79	747.10 ± 36.02	5.06 ± 0.38
Goat Dung + gram bran	81.88 ± 0.01	921.06 ± 27.47	6.79 ± 0.05
Goat Dung + wheat bran	67.05 ± 0.89	824.02 ± 14.09	6.01± 0.21
Goat Dung + vegetables wastes	43.10 ± 0.79	775.33 ± 32.48	5.14 ± 0.12

Students T test was applied to compare the significance (P < 0.05) between different combination of dung with agro and kitchen wastes.

### Result and Discussion

The vermicomposting of BMW was shown to be more efficient than natural composting, according to the results. Table-1 provides an overview of the physical and chemical properties of animal wastes prior to usage. Both of these animal waste samples had pH values that were in the alkaline range (8.1-7.4). The wastes had a moisture content ranging from 21.8% to 73.4%. Goat dung has a higher total organic carbon (TOC) content than sheep manure. C: N ratio was 93.4 percent in goat dung.

Agro/kitchen waste were combined with these two wastes and parameters of combinations were used to detect the growth and development of earthworm *Eisenia foetida*. The combination of gram bran and goat manure is optimal for the growth and maturation of earthworm *Eisenia foetida*, as measured by the quantity of earthworms, their weight, and their length (Table -2).

The weight gain of *Eisenia foetida* was affected by density of population and the type of food ingested. The metabolic quality of feed is a critical factor in determining the period required for sexual development and the onset of

reproducing, and it accounts for the highest increase in soil

organisms numbers when goat and gram bran are mixed.

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