

## Livestock Waste Management-Novel Methods for Improving Farm Productivity

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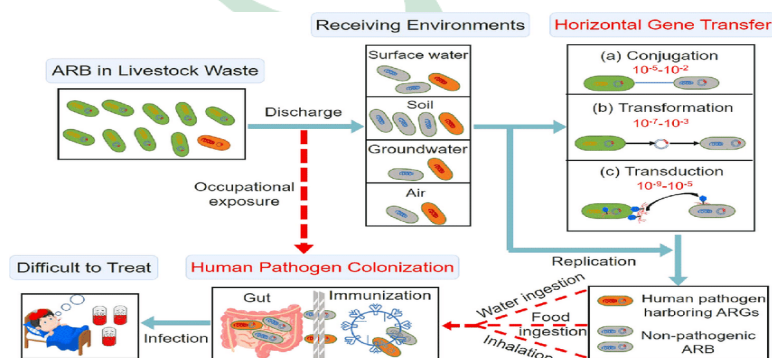
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Livestock waste is a major source of toxic gases and various potent pathogens related to public health concerns. It comprises of 40% of total global methane production by different livestock and agricultural by-products. Thus, bio waste recycling plays an important role in protecting environment and benefits human health by transforming into different economic products. It is necessary to mitigate this problem by converting the waste into biogas and vermicomposting to increase crop productivity and sustainability for farmers benefits.

According to the census, two leading countries of Asia using biogas technology are India and China that purifies biogas at 150 bar pressure and can be used as CNG cylinders for cooking and vehicle application. It approximately saves upto 11,300  $\square$  /day that constitute a good amount to be looked for.

Traditionally, cow dung was used for cooking food in rural areas of different developing countries. Appropriate use of cattle dung and urine into different pesticides, manure and medicines can generate employment for millions of rural people as well as it helps in improving soil fertility by declining use of chemicals as fertilizers. The integration of recent works i.e., composting and vermicomposting together, requires less time and substrate that can be converted into various valuable products. Even the waste from livestock can be used as feed for integrated fish farming.



**Novel techniques in practice-**

Biowaste management technologies practiced in urban areas are generally classified into different categories-

**Direct use-**

It is the ancient method of waste management which involves unprocessed bio waste in land application, as direct animal feed and can also be used in combustion. It was reported that animal droppings are the major source of noxious gas production like ammonia, hydrogen sulphide and carbon mono oxide that acts as the prime source of greenhouse house effect and also are vigorous pathogens shedder in soil. According to WHO, more than 100 pathogenic species of organism are capable of surviving in the environment and causing potent health hazard to animal and human both.

**Biological treatment –**

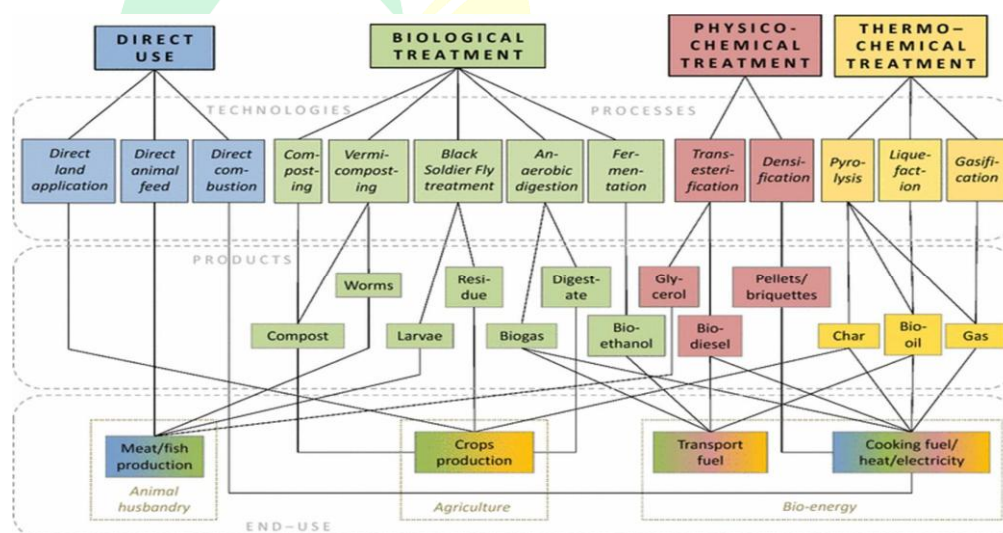
It refers to the technique that uses living organism for the conversion of waste into bio energy that requires mainly the humid environment for microbials' survival. It involves various techniques like-

- Composting- Aerobic decomposition of organic matter under controlled condition to form stable organic product that is humus. It was an ancient practice followed by civilians in Japan, China, India as per the documentation by Greek and Roman's. The main factor responsible for composting intensity of microorganism is the ratio of C: N.
- Vermi composting – Refers to the stabilization and degradation of organic waste by microbes and earthworms under controlled microbial conditions
- Black soldiers fly- It is the modern technique which involves the conversion of bio waste into insect oil and protein by the use of black soldier fly.
- Anaerobic digestion- A well established process of engineering involving the decomposition of both liquid and solid waste by various bacterial activities under anaerobic condition. It is also known as biomethanization. It can be practiced on large amount of sludge, algae, slaughter house waste and animal manure.
- Fermentation – It is an important step for ethyl alcohol production, which is the leading bio fuel in world market. Bio ethanol can be derived by biomass of starch, sugar and lingo cellulose.

### Thermo chemical treatment-

It uses heat for several chemical reactions to extract energy carriers as products. They are faster and cheaper as compare to the biochemical reaction. It includes

- Pyrolysis- Method that uses 450-55°C temperature for the decomposition of biomass into various valuable products under anaerobic conditions.
- Hydrothermal liquification- Uses compressed hot humid environment for the breakdown of biopolymer compounds into bio raw materials that can be later used as biofuel. It is also known as direct liquification.
- Gasification- Thermal treatment converting carbon materials into synthetic gases for the value- added production of fuels and chemicals. It is very eco-friendly and cost-effective technology.



### Conclusion-

The waste derived from livestock can be managed by various modern techniques to deal with rising energy prices and reduces environmental threats in comparison with the traditional practices. Various examples like CNG cylinders, algae cultivation etc are effective alternatives for the recycling of potent greenhouse gases into several value- added products. Dead animals, birds, pig carcasses etc can also be successfully decomposed into nutrient rich organic matters. Integrated composting and vermin composting are not only the powerful alternative but also are economically feasible for the people in rural areas. Hence it is necessary to manage the waste derived from animal sources in eco-friendly manner, which ascertain high profit to the animal owners and elevates different environment impacts.