

Hatchery Waste Management

Anuj Singh¹ and Rahul Singh Chandel²

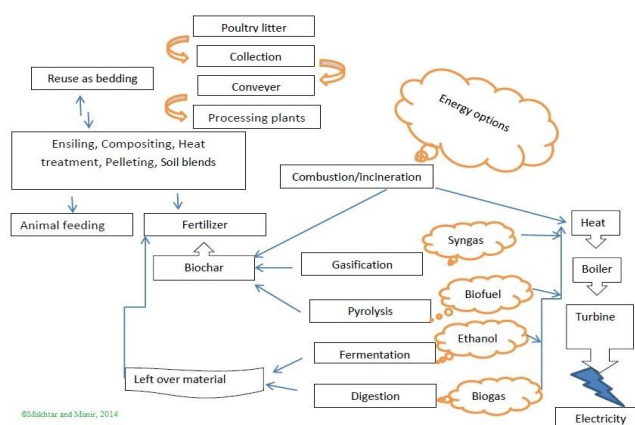
¹PhD. Scholar, Animal Nutrition, LUVAS Hisar

²M.V.Sc. Scholar, Animal Nutrition, LUVAS Hisar

ARTICLE ID: 051

INTRODUCTION:

The poultry industry waste includes solid waste and wastewater. The solid waste comprises infertile eggs, dead embryos, empty shells, late hatchings, dead chickens etc. The wastewater sources are water that is used to wash down hatchers, incubators, chick handling areas etc. Continuous seepage of waste or effluents from various livestock industries into the groundwater or streams and rivers is one of the major causes of increased nitrate and phosphate concentration in drinking water. The traditional disposal methods for solid hatchery waste are landfills, composting, rendering and incineration. Mostly hatchery waste is sent to landfills or composting, which costs the chicken meat industry millions of dollars each year in disposal costs. Very little hatchery waste is rendered. The methods of wastewater disposal include sending it to the land fill, using it for irrigation, disposing it directly into the sewerage or a wastewater lagoon. A very few hatcheries use waste water treatment systems. Hatchery waste in landfills will naturally break down and produces methane gas. Hatchery waste can be developed into high protein feedstuffs, other value-added products or utilized as an organic fertilizer if treated appropriately. Excess application of organic waste as fertilizer can result in nitrate (NO₃) contamination of groundwater which may result in blue baby syndrome, cancer and respiratory illness in humans and foetal abortions in livestock.



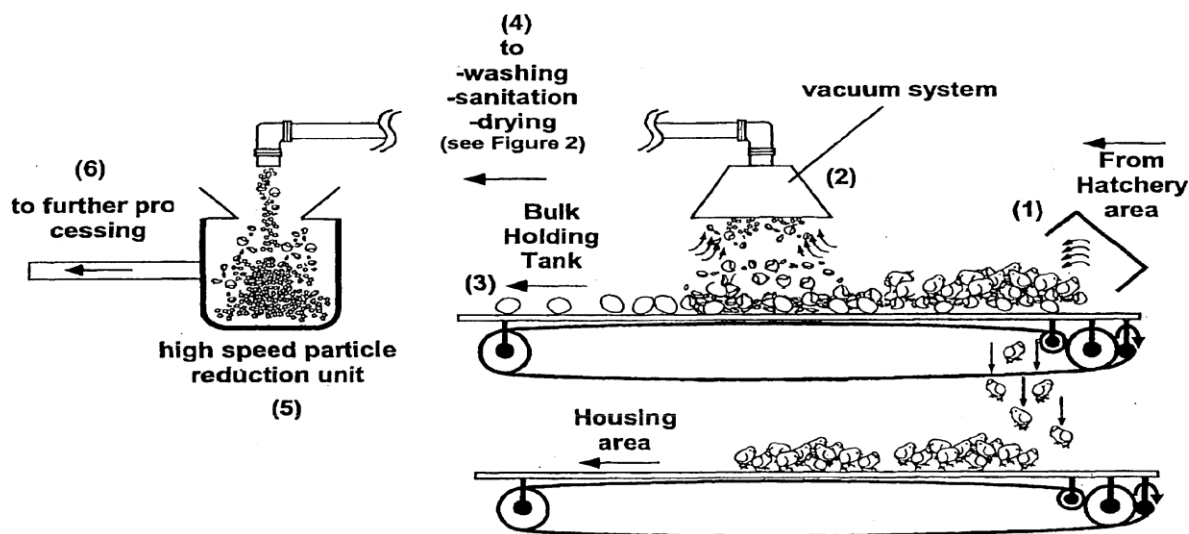
HANDLING OF HATCHERY WASTE:

Most hatcheries use a vacuum extraction system to transfer the waste into bins while some hatcheries store the waste in a room and then place the waste into a Bio-Bin. Other hatcheries will first crush the waste and then use a vacuum or auger system to transfer the waste into the bin. Another disposal option is using a centrifuge to separate the liquids from the solids of which the liquid is refrigerated and transported to a pet food manufacturing plant and the solids are sent to landfills. Hatchery waste should be separated into solid and liquid waste and then treated separately.

SEPARATING EGG SHELLS FROM HATCHERY WASTE:

By using a powerful suction vacuum, we can remove the dry, very light shells from the hatchery waste, leaving the heavier infertile eggs. The shell and non-shell materials can also be separated by using a vibrating device like a shaker-sieve belt which separates lighter parts from heavier parts among hatchery waste. Also, a gas stream such as a cyclone forced-air separator can be used to separate lighter materials from heavier materials. After hatching, live chicks and unhatched chicks or clear eggs are placed on a moving belt with fixed gaps which only allow chicks to slide through but shells and unhatched eggs are retained on the belt. Thereafter the shell is vacuumed up for further separation, and the dead embryos being disposed into a separate container.

Hatchery Waste Shells from Hatchery Waste



METHODS TO RECYCLE EGGSHELLS: To increase the mineral content of the compost, egg shells can be composted with other organic materials. Complete separation of the shell and membrane will increase the value of the end products. For this, one method includes the use of a meat processing machine to grind eggshells resulting into powder and then mixing the powder with water to separate the membrane. The shell will sink and the membrane will stay suspended in the water. Eggshell membranes have about 10% collagen, which can be used in medicine, for skin grafts, angioplasty sleeves, plastic surgery, dental implants, treatment of osteoporosis etc.



Other minor uses for crushed eggshells include:

- Spread around plants to deter slugs and snails
- Mixed with garden soil for use as a fertilizer
- Fine pieces of crushed eggshell mixed with seeds for use as a feed for aviary birds
- Added to cement to increase its strength
- Used by artists to make mosaics and
- To make textured paint for 3D effects in the artwork.
- Used as a component of biodegradable plastic
- Eliminate heavy metal ions from a dilute waste solution.

SOLID WASTE TREATMENTS SYSTEMS:

1. **Power generation:** An incinerator system could be used as a furnace to heat the solid and liquid waste leading to steam production which can power a turbine generator to generate electricity. But the use of steam turbines is only economic if a large volume of waste from the hatchery is generated.
2. **Rendering:** The rendering process simultaneously dries the material and separates the fat from the protein and yields fat and a protein meal (e.g., hatchery waste by-product

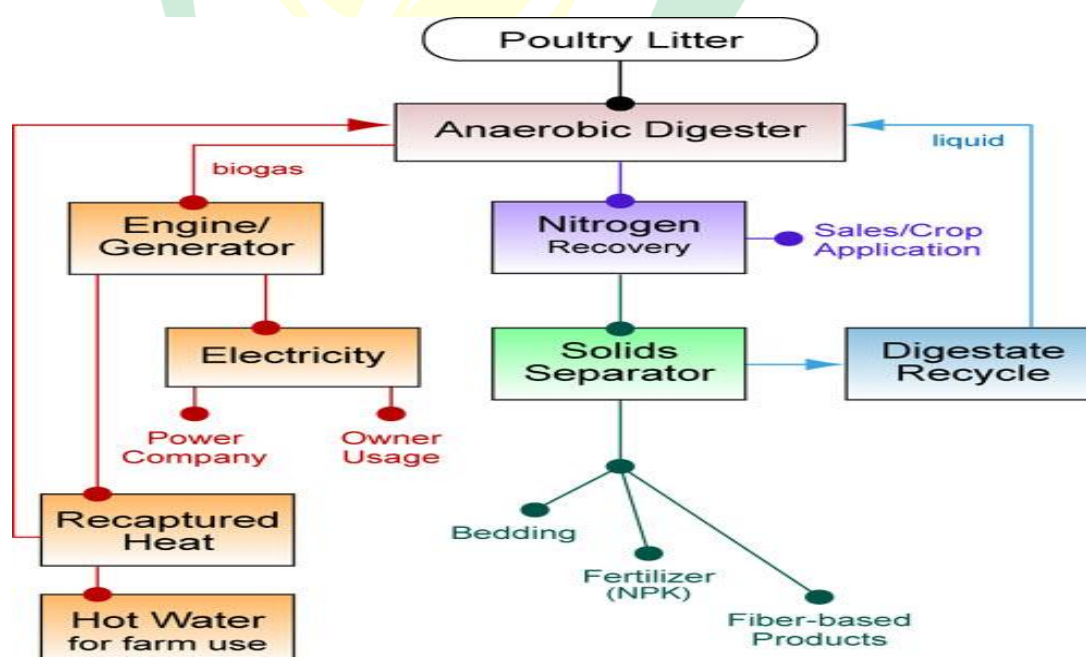
meal) similar to meat and bone meal or fertilizer. To render hatchery waste or not will depend on whether it is cheaper to transport the waste to a rendering facility or to send it to a landfill.



3. **Autoclave:** Autoclaved hatchery waste could be used as livestock feed.
4. **Boiling:** Hatchery waste could be treated in the same way as poultry waste by boiling at 100 °C with a pressure of 2.2 kg/cm² for 15 min; then boiled again at 100 °C for 5 hours, followed by boiling at 130 °C for 1 h then cooled to ambient temperature. Likewise, dead embryos could be boiled for 100 °C for 30 min, soaked in cold water for 20 min to remove shells, sun-dried for 4 days and used in poultry feed.
5. **Ensiling:** In this process, eggs were mixed in a 1:1 ratio with formic and propionic acids for 8 weeks at room temperature. These acids act by intervening in the metabolism of the microorganisms that are involved in spoilage. In addition, the reduced pH will create an environment that is unfavourable for such microorganisms.
6. **Composting:** Composting is one of the commonly used methods for solid organic waste disposal. The hatchery waste is mixed with wood shavings to reduce the moisture and then composted. In composting, mesophilic and thermophilic microorganisms will convert biodegradable organic waste into a value-added product. Aerobic bacteria, yeasts and fungi will decompose the organic waste. The composting process will convert ammonia nitrogen to organic nitrogen, kills pathogens and reduces the waste volume. The product can also be used as a fertiliser. Disadvantages of composting include loss of some nutrients including nitrogen, odour problems etc.



7. **Anaerobic digestion systems:** Anaerobic digestion involves the degradation and stabilization of organic waste under anaerobic conditions by microbial organisms to produce methane and inorganic products. A major advantage of it is being a high efficiency process and biogas production for power generation or heating. The bio solids left after the digester process are being sold as a high-quality fertilizer. The treatment system has advantages in terms of cost as well as environmental benefits due to the recycling of waste. The benefits also include income from the sale of electricity generated through biogas and fertilizers to produce bioproducts such as algae, zooplankton and fish as livestock feed.



CONCLUSION:



Altogether, hatchery wastes can be effectively utilized if properly treated to reduce the ill effects and a range of value-added products like fertilizer, animal feed, electricity, bone meal and biodegradable plastic can be produced. Thus, using above mentioned methods poultry farmers can not only gain benefits economically, but it will also be an environment-friendly approach.

