FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
POULTRY DEVELOPMENT REVIEW

Poultry waste management in developing countries

Slaughterhouse wastes

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INTRODUCTION

Slaughterhouse wastes from poultry processing include processing water and organic solid by-products. This is also true of very small-scale processing facilities and village and home (backyard) flock operations. The World Bank Group (2007) provides detailed and useful environmental health and safety guidelines for all steps of poultry processing, from the reception of live birds, through slaughter and evisceration, to simple waste processing. This information note focuses on the utilization of organic solids, of which an estimated 1 million tonnes are generated every year worldwide. As for poultry production wastes (manure and litter), these organic solids should be considered both potential resources and potential environmental pollutants, depending on how they are processed and managed. Similarly, the siting of slaughterhouses, like that of production facilities, should give careful consideration to biosecurity and near neighbour issues. The size of the slaughter facility also has implications for environmental and food safety practices and issues – again, the size issue is similar for poultry production facilities.

The treatment and environmental fate of processing wastewater and organic solid wastes should be based on site-specific requirements, regulations and the location of the slaughterhouse. For example, some regions have very specific requirements for the organic and inorganic wastes that are discharged into surface waters following treatment, and some have restrictions or regulations for the processed solids destined for animal feed components. When possible, the treatment of solid waste should aim to produce value-added sellable by-products, such as animal or aquaculture feed components, energy (through biogas production) and agricultural fertilizer. For very small or backyard flock operations, slaughter is likely to generate very small quantities of solid wastes, and the management of these wastes should focus more on proper disposal and recycling (burial or composting) regarding biosecurity and human health issues.

COMPOSITION, CHARACTERIZATION AND REPROCESSING OF SLAUGHTERHOUSE SOLIDS

Poultry carcass yields are typically about 70 to 75 percent of the live bird weight; the quantity of potentially sellable solid waste depends on the efficiency of the processing methods and the health of the birds prior to processing.

Blood is approximately 2 percent of the live bird weight, and a source of highly concentrated protein when filtered and dried to produce blood meal. During slaughter, blood is typically collected separately from the other viscera and, depending on cooling conditions and storage time prior to further processing, may require chemicals to prevent coagulation. Processed blood meal can be used in animal and fish feed as well as fertilizer.

Feathers comprise approximately 7 to 10 percent of the live bird weight and are another source of protein (75 to 90 percent crude protein), although the utilization value of feathers as an animal feed component depends on further processing methods (e.g., high-pressure cooking at > 100 ^{o}C or enzymatic treatment) to improve digestibility. Processed feathers can also be used for bedding, clothing and other niche market items for humans.

The head, feet (recovered for human consumption in some regions) and inedible viscera make up the remainder of slaughterhouse solids. Following further processing by methods such as conventional rendering at specified temperatures and pressures, depending on the intended fate and risk factor of the material, sellable products in the form of protein-rich meals and fat are produced. Extensive further processing of these by-products may not be required in some areas, if biosecurity precautions are taken. For example, high-quality inedible viscera wastes are in great demand for intensive fish culture in some regions, and may require only simple on-farm grinding and mixing with a binder prior to use.

Regardless of location, before reprocessing, slaughterhouse solids can be broadly characterized as low-risk material originating from healthy birds, and high-risk material that may transmit disease to humans, livestock or poultry. For example, high-risk material would originate from birds that died from causes other than slaughtering, or birds or bird parts condemned as unfit for human consumption. Birds confirmed or suspected of carrying transmittable disease, especially a disease such as highly pathogenic avian influenza (HPIA), should be characterized as high-risk material. Care and management steps should be taken to keep high-risk materials separate from low-risk materials, as mixing of the two results in the entire batch being classified as high-risk. This is important not only for health and safety precautions but also for economic reasons related to the additional processing requirements for high-risk versus low-risk materials. The treatment of high-risk material intended for animal feed or fertilizer is typically an energy-intensive rendering or alternative heat treatment process, whereas reprocessing of low-risk material may include less stringent methods to make use of the solids for animal or aquaculture feed. For materials that are not suitable for processing into the food chain, alternative methods to be considered include approved burial, aerobic composting or treatments for energy production and/or processing for use as agricultural fertilizers.

The utilization of slaughterhouse solid by-products for animal feed is becoming increasingly restricted in many parts of the world. In such areas, anaerobic digestion – the biological degradation of organic matter into methane under anaerobic conditions – is an alternative that provides an opportunity for energy recovery and, depending on the type of anaerobic digestion employed, for reducing pathogenic microorganism in the solid substrate digested. Properly managed, anaerobic digestion can also reduce nuisance odours associated with slaughterhouse wastes, and conserve the non-carbon nutrient components in the digested material, which can be recovered for fertilizer or possible feed use. Salminen and Rintala (2002) provide a comprehensive review and relevant information to determine the applicability of anaerobic digestion and material recovery from poultry slaughterhouse waste.

REFERENCES

Salminen, E. & Rintala, J. 2002. Anaerobic digestion of organic slaughterhouse waste – a review. *Bioresource Technology*, 83 (1):13-26. doi:10.1016/s0960-8524(01)00199-7.

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