

# **Meat Chicken Technical Environmental Note 3**

## **Composting and Pasteurising Spent Litter**

### **Composting Spent Litter**

#### **Introduction**

Composting is a natural aerobic process involving the breakdown of organic matter by microorganisms. The resultant product is a humus-like material that is a valuable organic fertiliser and soil conditioner. The composting process is optimised through the provision and control of water, oxygen, nitrogen (manure) and carbon (litter) in the substrate. Because composting is an aerobic process, odour generation is very low compared to anaerobic treatment or storage.

Composting is generally conducted in windrows about 1.5 m high and about 2-3 m wide at the base. To maintain enough oxygen, the windrows need to be turned weekly. If windrows are not turned weekly, the process may still proceed, just more slowly. The process should be complete in about 6-8 weeks, with an additional 4 weeks of curing time. By maintaining the correct moisture content (around 50-55% wet basis), carbon to nitrogen ratio (15:1 to 30:1) and oxygen concentration (through turning), the compost should reach and maintain temperature of 60-65°C. This temperature should be sufficient to destroy most weed seeds and pathogens. It is important that the windrow is completely turned to ensure all of the material is subjected to these temperatures.

Because spent litter already has a carbon source added in the form of clean bedding material, the correct carbon to nitrogen ratio is generally present in the raw clean-out material. Thus, the addition of nitrogen or a carbon source is not generally required. The moisture content of spent litter removed from the shed is generally 25-30%, if the litter has been managed properly during the growing cycle, thus additional water will need to be added to raw litter to bring it up to 50-55% (wet basis).

#### **Design and Management Considerations**

- Compost areas need to have an impermeable base to avoid leaching and possible groundwater contamination.
- The site should be well drained to avoid muddy conditions and excessively moist composting material.
- Appropriate siting of spent litter compost sites and additional bunding may be required to prevent extraneous runoff entering the pile and becoming contaminated.
- Nutrient rich runoff from the compost piles should be collected in a sump or dam and may be reused to add moisture to the pile.
- Compost piles need to be carefully managed to avoid dust and odour emissions. If the compost is too dry the process will be slowed and excessive

dust may be generated. If the compost becomes too wet, it may become anaerobic and result in excessive odour emissions. Optimum moisture content is around 50-55% (wet basis).

- While manure is being composted, there is an increased risk of fly breeding. In Western Australia, stable fly breeding is of particular concern and local regulations need to be checked with regard to spent litter composting.
- In some states, a separate licence is needed for compost production (e.g. South Australia).

### **Advantages of Composting**

- Produces a more consistent product than raw manure as the larger organic material is broken down.
- Reduces the weight and volume of the spent litter and increases the nutrient density, thus making it more affordable to transport further distances for land application.
- Heat generated during the process can destroy pathogens. This is particularly advantageous when spent litter is to be used on horticultural crops, where the use of raw 'untreated' litter is being reviewed and discouraged.
- Heat generated during the process can destroy weed seeds.
- The composting process promotes the mineralisation of nutrients, making them more available to the plant.

### **Disadvantages of Composting**

- Adds an additional cost to the treatment process (machinery and labour).
- The mass of nitrogen in the bedding is reduced through the loss of nitrogen via volatilisation.



**COMPOSTING SPENT LITTER IN A BUNKER**

## Pasteurising Spent Litter

Pasteurisation is the process of maintaining the litter at a minimum temperature to kill off pathogens and parasites. The mushroom industry, which uses large quantities of spent litter, pasteurise their substrate prior to use. Pasteurisation of mushroom substrate is generally carried out on the mushroom farm or by a specialist substrate producer, with the aim of eliminating all pathogens and parasites, and removing free ammonia. Substrate is generally mechanically pasteurised at a maximum of 60°C and under high relative humidity conditions for 6-8 hours.

Another form of pasteurisation is the heaping up of spent litter inside the shed between batches. This practice is sometimes used with the partial reuse of litter in an attempt to kill off pathogens and parasites between batches. The effectiveness of this has not been evaluated but may work effectively if all of the pile is exposed to a high enough temperature, for an adequate period.

*This Meat Chicken Technical Environmental Note was produced as part of the RIRDC – Meat Chicken Program project “National Environmental Management System for the Meat Chicken Industry, Project No. FSE-1A.*