Temperature, pH and Chemical Composition of Broiler Litter During Partial Composting

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Meat chickens in Australia are mostly reared on fresh litter materials such as wood shavings. Such materials are becoming increasingly unavailable and expensive. Reuse of litter for raising multiple batches of chickens is an option used in many countries despite the risk of pathogen carryover and compromised productivity. The small number of Australian growers who reuse litter (East 2007) use composting by heaping or windrowing of litter in sheds between batches of chickens to of inactivating pathogens and improving the physical condition due to the heat generated.

As part of a larger study investigating pathogen inactivation following heaping and windrowing of broiler litter we measured the temperature profile at various depths in heaps and windrows over 9-10 days and also assessed changes in litter dry matter, pH and chemical content in two experiments on commercial broiler farms.

Expt. 1, on a Sydney farm, compared windrowed (Win), heaped (H) and heaped litter with mechanical turning on day 3 (HT) over 9 days. Expt. 2, on a Brisbane farm, compared windrowed litter (Win) and the same mechanically turned at day 4 (WT) with no heaping (NH) in which litter was undisturbed *in situ* apart from mechanical ripping at day 4, over 10 days. Temperature was recorded at 15-minute intervals using iButton data loggers at the various depths. Representative litter samples were collected at 4 times for determination of pH, dry matter, nitrogen, potassium and carbon contents.

In expt. 1 H had higher mean temp than Win ($P<0.05$) due to more sustained heating (Fig. 1a). In expt. 2 the NH treatment did not result in any heating with temperatures below 30˚C throughout, while the Win produced similar temperature profiles to that seen in Expt. 1. In Expt. 2 turning had no effect on temperature while in Expt. 1 it increased after turning by 2-4˚C. Depth within the heap had profound effects on the temperature profile (Fig. 1b) with surface temperatures remaining around 30˚C and unlikely to induce significant pathogen inactivation. Litter dry matter increased with time post heaping/windrowing from ~74% to ~77%. Litter had an alkaline pH (~8.6) which declined with time in heaped/windrowed litter (by 0.2-0.4) over 9-10 days. There was a significant positive association between the dry matter content and litter pH ($R^2=0.33$, $P<0.001$).

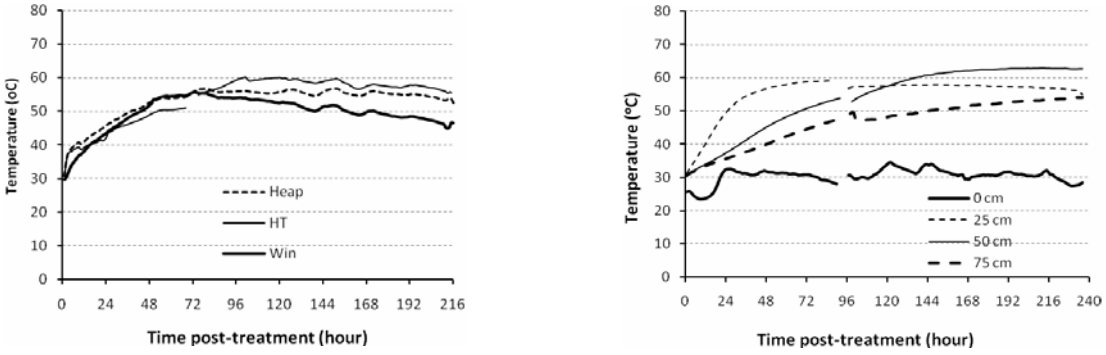

Fig 1. Mean temperature profiles for a) different litter treatments in Expt. 1 (Left) and b) for various depths in the W and WT treatments combined in Expt. 2.

Sustained temperatures above 50˚C were achieved during litter heaping and windrowing with high temperatures persisting for the duration of measurement. These temperatures are likely to induced significant inactivation of poultry pathogens, and indeed this was observed in these experiments (Islam et al., 2010).

East, I.J., 2007. Aust. Vet. J. **85**, 107.
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