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Reducing Particulate Matter from Inlet Air of Layer House with Electrostatic Air Filtration System

Introduction



- HPAI outbreak and possible airborne transmission of pathogens;
- Air filtration as a preventative tool for poultry production.

The objectives of this study were to: (1) assess removal efficiency of an Electrostatic Air Filtration System for particulate matter (PM) in winter; (2) evaluate the effect of electrostatic particle ionization (EPI); and (3) analyze potential influence of air filtration system on ventilation performance of the hen house.

Materials and Methods

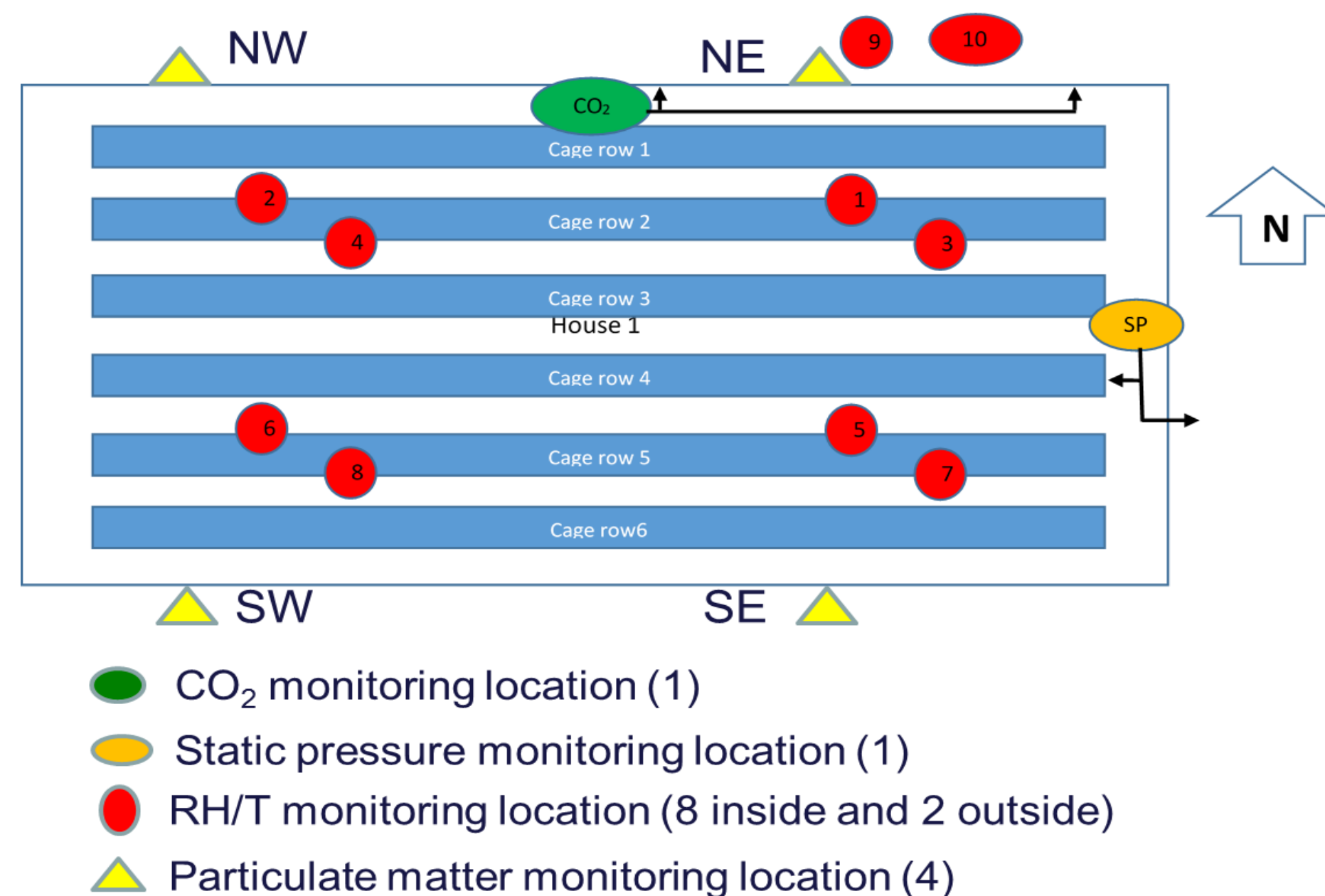


Figure 1. Layout of monitoring site



Figure 2. PM removal efficiency (RE) measurement

The Electrostatic Air Filtration System (low grade air filter and EPI system) was installed to the hen house on November 10th 2016 at a laying hen farm in north Iowa. The test was started in December 2016 then repeated every two weeks. PM concentrations together with other house environmental parameters were measured across (Fig. 1 and Fig.2).

Results

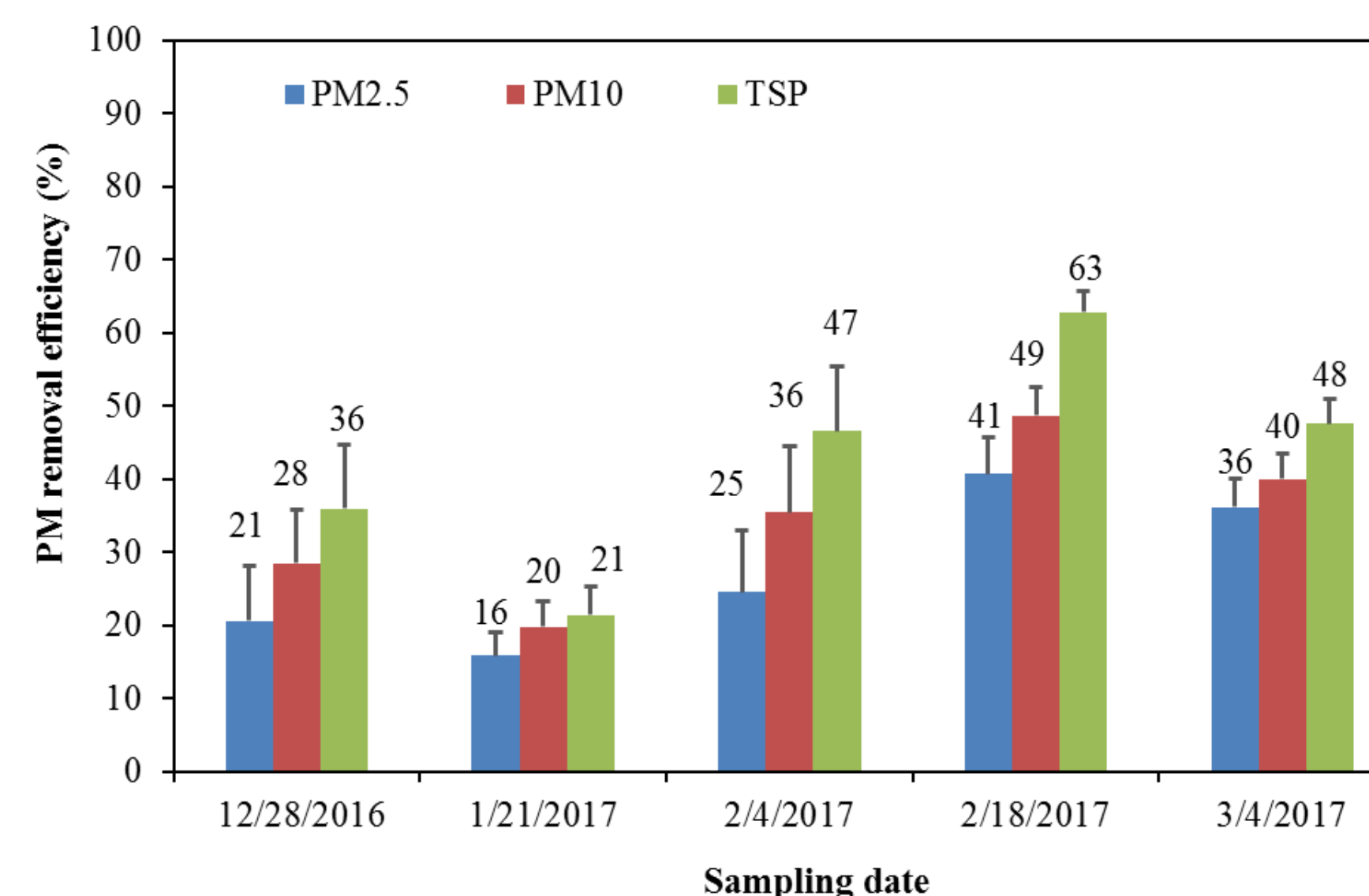


Figure 3. PM removal efficiency

PM removal efficiency was up to 60% for this test, more efficient with larger PM removal. (Fig.3). The system with ES on showed higher RE than off, e.g., RE for PM_{2.5} was 31% with ES on and 8.5% with ES off (Fig.4).

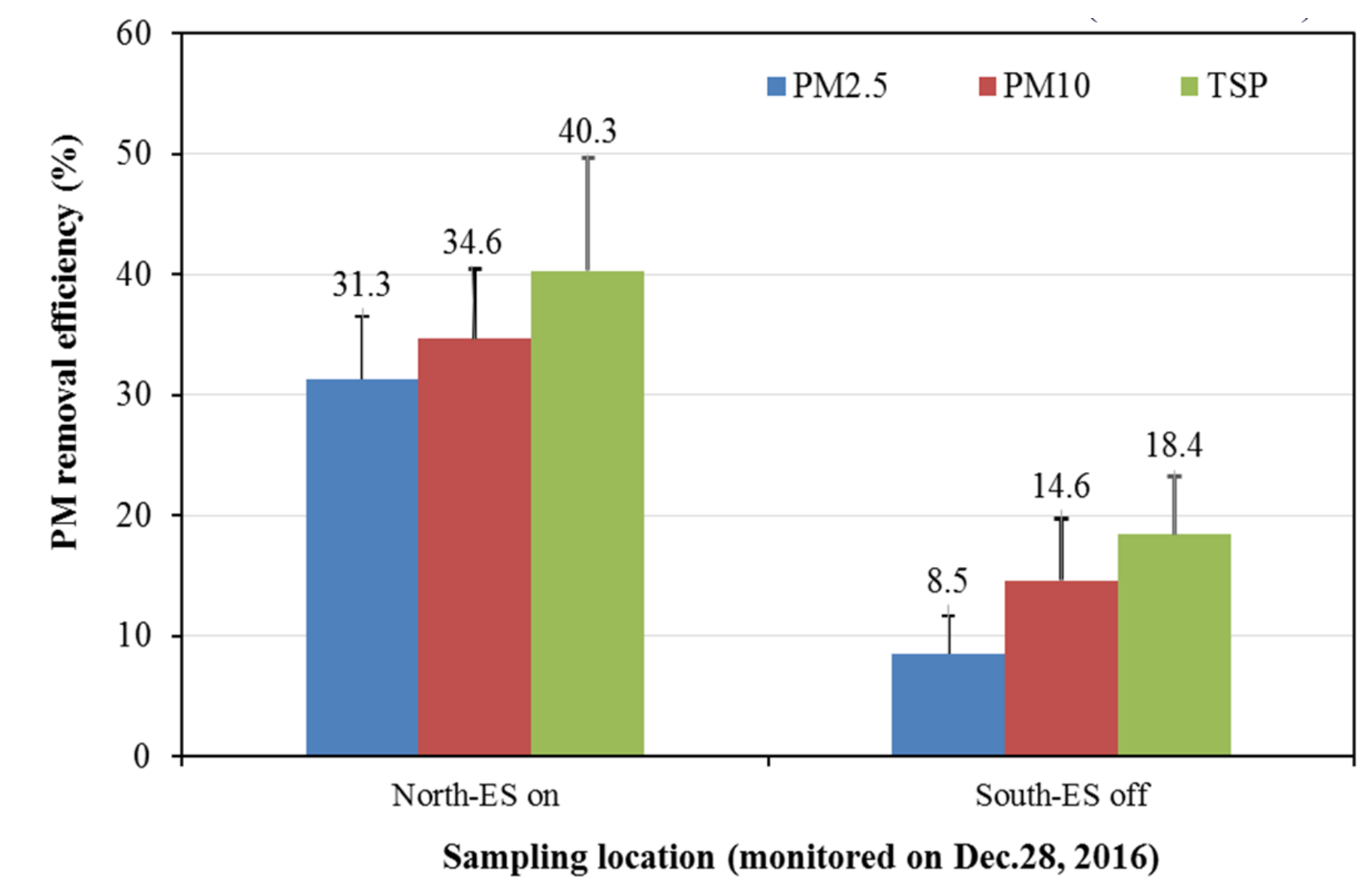


Figure 4. PM removal by filter with ES on vs. off.

The layer house static pressure was below 0.2 water inch across winter, house temperature could maintain at ~70F despite cold outdoor temperature (e.g., -20F). House CO₂ level was within the normal range across the winter.

Summary and Conclusions

- (1) Removal efficiency of the Electrostatic Air Filtration System was up to 60% for the winter test; more efficient with larger PM removal.
- (2) Filter with electrostatic (ES) on had higher RE than ES off.
- (3) Air filtration system didn't limit house ventilation over winter time.