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The Effects of a Sprinkler Cooling System on Dust Concentrations in Broiler Chicken Production

Primary Presenter: Sarah Williams Ischer, Master's Candidate Industrial Hygiene, University of Iowa.
Additional Authors: Matthew W. Nonnenmann, PhD., University of Iowa; Tom Tabler, PhD., Mississippi State University; Morgan Farnell, PhD., Mississippi State University.
Learning Objective: The purpose of this research is to evaluate the effectiveness of a sprinkling system to reduce inhalable dust and ammonia concentrations in a broiler chicken house. The results should provide insight towards future engineering interventions to reduce dust inhalation exposure during work in broiler chicken production.

Objectives: Limited research has been performed evaluating engineering controls to reduce dust concentrations in broiler chicken production. The purpose of this research is to evaluate the effectiveness of a sprinkling system to reduce inhalable dust and ammonia concentrations in a broiler chicken house. The results should provide insight towards future engineering interventions to reduce dust inhalation exposure during work in broiler chicken production.

Methods:Inhalable dust and ammonia concentrations were measured daily for the entire production cycle of a flock of broiler chickens (63 days). Inhalable dust was measured using a Button sampler and ammonia was

measured using a direct reading instrument. Sampling was performed on a mannequin inside two broiler chicken houses. One house used a sprinkler cooling system to deliver a water mist throughout the house and the second house was an untreated control. The sprinkler system was activated from day 5 through day 63 of the boiler chicken production cycle. The following sprinkler activation program was used each hour from 6am to 10pm: days 5 – 9 five seconds, days 10 – 14 ten seconds, and days 15-63 for fifteen seconds.

Results: Dust concentrations in the house treated with the sprinkling system (Geometric Mean =2.1; GSD=8.2) were lower than dust concentrations in the control house (GM=2.1; GSD=8.1). The observed difference approached statistical significance (p = 0.071). Ammonia concentrations were very similar in both houses and the difference was not statistically significant (p=0.223).

Conclusions: Inhalable dust concentrations were reduced in the sprinkler house. However, the difference between the two houses was not significantly different and the observed reduction in dust concentration was not sufficient to eliminate the use of respiratory protection. Future research should evaluate the use of a chemical amendment to reduce re-aerosolization of dust, in addition to the use of a sprinkler system.

Special Note: This work was completed by a student during their first year as a Masters Candidate.

Iowa's Center for Agricultural
Safety and Health
UI Research Park, 124 IREH
The University of Iowa
Iowa City, IA 52242