ABSTRACT
National outbreaks of avian influenza viruses have been the source of a wide range of adverse effects for the country, including the culling of thousands of birds, economic damage to commercial farms, increased product prices, and blocked international trade. Tennessee is heavily involved with the poultry industry and an outbreak of avian influenza could have serious economic impact. Currently, a standardized system to control and prevent the spread of the pathogenic viruses from entering chicken farms is lacking. This study evaluated the chemical compound chlorine dioxide to inactivate influenza viruses. Seven different strains of influenza were exposed to chlorine dioxide gas and tested at concentrations ranging from 50 parts per million to 500 ppm at time intervals ranging from 30 minutes to 4 hours. As the concentration of chlorine dioxide increased, the length of exposure necessary to bring the virus titer to zero decreased. At 500 ppm, virus was completely inactivated by 30 minutes.

INTRODUCTION
This study was conducted to investigate a potential preventative measure against type A influenza viruses. By June 2015, 22 states had confirmed cases of a high pathogenic avian influenza (HPAI) virus, many of these cases occurring in poultry (1). These viruses have a 90-100% mortality rate in untreated poultry flocks (2). A chicken with avian influenza is seen in Fig 1. Type A viruses are characterized by the proteins on their surface, the Hemagglutinin and Neuraminidase (Fig 2). These proteins are pivotal for infection and spread of the virus by binding to the host cell (3). If the hemagglutinin protein is unable to bind, infection cannot occur.

RESULTS
Figure 5 above shows results of a hemagglutination assay. The last well with the blood cells in suspension is the virus titer. A red dot indicates the absence of virus. Chlorine dioxide completely inactivated all influenza strains within 30 minutes at the highest concentration of 500 ppm (Fig 6, below).

DISCUSSION
While the inhibitory effects of chlorine dioxide on influenza has been described (3), this is the first study to evaluate different influenza strains against varying concentrations of chlorine dioxide and times of exposure. Based on our results, chlorine dioxide has the potential to be a highly effective way to inactivate influenza viruses and perhaps prevent additional outbreaks among poultry.

LITERATURE CITED

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