

## **Evaluation of the modified chimney performance to replace mechanical ventilation system for livestock housing**

### **Abstract**

The demand of poultry products and prices are increasing very rapidly. Therefore, modern poultry industry is using mechanical ventilation system in closed housing to support the increased growth rate of the birds. Ventilation system is used to produce the healthier and quality broiler by reducing indoor air pollutant concentration and temperature. Currently, the price of fossil fuel is increasing day by day; therefore, minimization of overall cost of poultry production needs reduction in energy consumption or introduction of cheaper and alternative energy sources. Although solar heating system is used in broiler industries during winter but limited research was done on natural wind-driven ventilation system. In the current study, natural draft chimney was modified with wire mesh screen and was designed for the enhanced ventilation. In laboratory, it was found that the modified chimney significantly minimized the draft losses and increased the ventilation rate up to 60 to 90 percent compared to the normal conventional chimney. The Computational Fluid Dynamics (CFD) showed that the chimney performance was significantly improved in the modified solar chimney than that in the normal one. It is suggested that modified solar chimney can be used to replace the mechanical ventilation system in poultry farming to reduce the production cost as well to meet the demand of animal protein for human beings.