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**Effects of a modified building and proactive ventilation on energy and water consumption in a broiler barn**

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**Abstract:**

**Background/Objective:** The objective of this study was to establish a modified conventional broiler barn with a proactive ventilation as prototype. The hypothesis was that this can reduce water and energy consumption, thereby contributing to a more cost-effective and climate-friendly broiler production.

**Methods:** The study was performed on a conventional farm operating with long-fattening in two barns for planned ten consecutive fattening periods, each starting with 25,000 Ross 308 broilers per barn. Animals were fattened until day 42, with 1/3 of animals being slaughtered at day 32. The trial barn (T) was equipped with twin shells for improved insulation. Fresh air was pre-warmed/-cooled using heat exchangers. The barn was equipped with central air inlets and outlets. A model for predicting the necessary air exchange rates based on animal weight, feed, water intake and resulting CO2, NH3 and air humidity was developed using data of three fattening periods. CO2, NH3 and air humidity were monitored continuously, while litter humidity was assessed bi-weekly.

**Results:** Mean water usage in T was 5.4 ± 0.2 l/animal vs. 6.4 ± 0.3 in the control barn (p=0.002), while electricity used was 0.06 kWh/animal in both barns (p=0.583). Litter humidity was decreased in T (32 vs. 50%; p<0.001). Air humidity in T was decreased (58% vs. 67%; p=0.008). Concentrations of NH3 and CO2 were below legally required thresholds in both barns.

**Conclusion:** These results indicated that a modified broiler barn with twin shells, central air in- and outlets and proactive ventilation might contribute to savings of resources, while at the same time improving barn climate and litter quality. The system has not been tested during all seasons yet. Furthermore, the study included one single farm. Consequently, effects of farm and barn cannot be excluded.

**Keywords:** broilers, energy saving, barn climate