EXPERIMENTAL STUDY OF COOLING AIR SUPPLY POULTRY PREMISES

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The search for effective ventilation systems to save energy in the agro-industrial complex, and, in particular poultry, attracted most interest of scientists and practitioners. Particularly noteworthy issues of scientific evidence and improve air cooling poultry premises in the process of reconstruction and implementation of innovative, engineering developments, which provide weighty Energy-saving operation of such systems and increase their efficiency.

The combination of heat and humidity conditions that poultry house shall be established as a result of heat and mass transfer processes occurring both in the middle of the room, and through its external protection. This mode is influenced by the heating and ventilation depending on meteorological parameters of air and thermal characteristics of building structures. In carrying out theoretical studies related to the regulation of heat exchange processes in poultry houses, come to receive data calculations that give the opportunity to the right choice of ventilation of poultry houses.

In the warm period at temperatures above 26 ° C most use tunnel ventilation poultry premises, which makes it possible to ensure the removal of excess heat that is released birds. It should be noted that at high ambient temperatures and high humidity, the system requires a special device for cooling and creating optimal microclimate in poultry house. In the ventilation system to reduce inlet air temperature in the summer time cooling systems often use different types, the vast majority by spraying water: nozzle, methods and evaporating disk cartridges through forced cooling. All cooling systems have found their place in the poultry industry, and along with the fact they somehow justifies himself, and in some not, as they have a different principle.

The purpose of research - experimental studies cooling supply air to maintain optimum microclimate poultry premises in the summer season.

Materials and methods of research. Tunnel ventilation works in the summer season. At this stage it is important to ensure the removal of excess heat, which can cause the bird. Included with tunnel ventilation is often used cooling system. In this case, the cooling system will recuperative heat exchanger. Through a numerical simulation of transfers heat and mass transfer and calculation of local hydrodynamic and thermal characteristics of fresh air in poultry indoors in the summer time with the package ANSYS Fluent CAD 14 and develop a new method for cooling chicken houses using heat exchanger, heat exchanger, which is used as the coolant underground water wells selected optimal mode of ventilation in poultry houses.

Modernized and improved tunnel ventilation system using new heat exchangers and studied all aspects of the process, expanded scientific space studies to create effective systems cooling chicken houses in the summer time. The calculations and the general concept of computer modeling allowed us to develop new setting and tube regenerative heat exchanger with variable-tangent method of placing the beam pipe located in a tunnel ventilation system.

Results. Experimental study of cooling in poultry indoors, the use of a heat exchanger, heat exchanger installed in the tunnel ventilation system in pursuit of effective maintenance microclimate for the birds. For identification of mathematical modeling of heat exchanger was conducted experimental research.

When conducting a pilot study of air that reported in the installation and fueled using heaters to temperatures of 27, 32 and 41 ° C, with input speed 9.25, 11.1 and 12.85 m / s. At the same time, the heat exchanger for cooling supply air temperature of the water received in the range of 12 to 13 ° C with a flow rate of 40, 45 and 50 l / min.

Water flow rate and inlet air to the heat exchanger and its temperature is constant. If you change the fan motor frequencies from 50 to 40Hz changing air speed at the inlet to the heat exchanger 9 to 13 m / s. These temperature recorded in the comparative charts of inlet air temperature of about 41 ° C, the water consumption of 53 l / min., The water temperature is 12 ° C and a variable speed air inlet of 9.25, 11.1 and 12, 85 m / s.

The value of Nusselt number increases with the Reynolds number, so the channels studied achieved in increasing the heat transfer coefficient on the surface of the beam pipes to 33%.

The total heat transmitted from the hot coolant to cold depending on the mass expenditure inlet air to the heat exchanger.

Dimensionless temperature at the inlet and outlet of the channel at different mass flow computer mathematical modeling is straight, but the experiment shows the temperature curve dimensionless heterogeneous nature.

Conclusions

Developed and manufactured experimental plant for cooling supply air in poultry premises, based on the use of heat-energy recovery where new construction as cooling the coolant water from underground wells.

A comparison of the results of numerical calculation of mathematical modeling and experimental data on heat transfer tube bundle by using statistical analysis. The obtained results of numerical modeling of error does not exceed 5%.