Global warming effects: future feasibility of current cooling equipment for animal houses

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Interest in global warming effects on the agricultural systems is currently high, especially in areas which are likely to be more affected by this temperature rising, i.e. the Mediterranean area (IPCC, 2008). According to this report, the model projections of surface warming predict a temperature increase between 0.5ºC to 1.5ºC in the European area by the period 2020-2029.

The aim of the present work was to assess the future consequences of the global warming effect on the feasibility of the cooling equipment in animal houses. Several equipment combinations were compared by means of modelling the inside climate in fattening pig houses, including forced ventilation and cooling pad. The modelling was carried out for six different European locations: Spain, Greece, Italy, The Netherlands, Germany and the United Kingdom, for the today conditions; secondly, the global warming effect in the inside climate was considered in a second set of simulations, and a mean temperature rising of 2ºC was taken into account.

Climate data. The six European locations were: Madrid (Spain); Aliartos (Greece); Bedford (The United Kingdom); Schipol (The Netherlands); Milan (Italy); and Stuttgart (Germany). From every location, the available climate data were monthly mean temperature (To; ºC); monthly mean relative humidity (HRo, %) and monthly mean solar irradiation on horizontal surface (So; W m-2). From these monthly values, hourly means were calculated resulting in 24 data for a typical day, each month.
Climate model. In this study, cooling strategies resulted from the combination of natural ventilation, mechanical ventilation and cooling pads. The climate model was developed taking into account the following energy fluxes: solar radiation, ventilation (Seginer, 2002), animal heat losses (Blanes and Pedersen, 2005), and loss of energy due to the cooling pads (Seginer, 2002).

Results for the present work, show a comparative scene of the inside climate by using different cooling equipment combinations, from natural ventilation to cooling pads. Simulations which include the effects of climate change show the evolution in cooling technologies which will be necessary in this kind of animal houses, in six European locations, if the global temperature rising continues with the current rate. The necessary changes in cooling technologies of animal houses, will be important in Europe when the outside air temperature rising is greater than or equal to two Celsius degrees.

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