

## 7a6 - Thermal modelling of livestock buildings for broilers to optimize the choice of equipment and control parameters

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Progress in genetics and broiler feed, associated with more specific needs of the processing and distribution sectors, have led to an improvement in the technical knowledge of farmers and their advisors.

Control of the animals' environment (temperature, humidity, air quality, air speed, lighting) allows the animals to fulfil their potential. The building and its equipment must provide optimal environmental conditions. However, management is complex because of the configuration of the building (size, insulation, type of soil,...), the number of pieces of equipment involved (ventilation, heating, heat exchangers, lighting), the number of possible settings for this equipment, interactions with the biological flux as well as with the climate. In addition to these difficulties for use are, on the one hand a variety of equipment and rapid technological changes, and on the other, the prospect of colder and hotter climate episodes than experienced in recent decades. Such complexity makes for delicate trade-offs when it comes to investing in new hardware.

One of the goals of the MEDIBATE project was to provide technical lighting by means of a model that:

- integrates the role of the equipment in regulating the environment and allows testing the consequences of different settings;
- integrates the diversity of biologic regulations notably according to animal density;
- calculates the environmental readings (temperature and humidity) according to the building, equipment, animals and climate hourly (detection of risk periods);
- calculates the economic outcomes associated with a production schedule, fixed and variable expenses.

By way of illustration, the first results of this model allow analysing the interactions between heating mode, minimum ventilation rate, climate, animals and their effects on hygrometry, CO2 concentrations, gas consumption, electricity consumption. Different scenarios are compared based on zootechnical performance, building insulation, and the presence of heat exchangers/regenerators. The aim is to provide advisors and farmers with a version and to extend the model to other types of production.