

Simulation of the indoor climate of livestock buildings: a tool to assess climate change scenarios*G. Schaubberger**University of Veterinary Medicine, Department for Biomedical Sciences, WG Environmental Health, Veterinärplatz 1, 1210, Austria; gunther.schaubberger@vetmeduni.ac.at*

In the future, the production of pig and poultry may be severely affected by heat stress. In temperate climate regions like Central Europe these animals are predominantly kept in confined housing systems. Therefore the impact of climate change scenarios on these systems cannot be assessed only by ambient meteorological parameters, as they are modified by the confined livestock building and the livestock itself. This means that the indoor climate, which is the environment relevant for a large share of farm animals, has to be considered by simulation models, describing the interaction between animals which release sensible and latent (water vapour) heat, the insulation of the building to capture the sensible heat, and the ventilation system. The ventilation system is the most effective link to the outside, but inevitably differences will occur between climatic conditions outside and inside livestock buildings. The indoor climate will in turn impact on animal health and welfare, productive, reproductive and economic performance. The features as well as the limitations of such simulation models will be presented and discussed. On the basis of such model calculations the husbandry conditions can be simulated to reveal the effectiveness of adaptation measures (i.e. adaptive capacity), which sums up to livestock and farm vulnerability. The thermal environment is a major parameter as it directly impacts animal welfare and health. The productivity of farm animals can be investigated by parameters which are sensible to the thermal environment: For fattening pigs and broilers this can be described by daily weight gain and feed conversion, egg production for laying hens and the reproductive performance of sows (litter size, number and body weight of weaned piglets, etc.). Furthermore, an increase of the airborne emissions (NH₃, odour) can be anticipated, leading to increased ambient concentrations, a reduced indoor air quality, and increased separation distances to protect the neighbours from odour nuisance.

Bayesian Networks to assess potential barn adaptations to climate change in dairy farms*E. Galán¹, A. Del Prado¹, E. Sanchís², F. Estellés² and S. Calvet²**¹Basque Centre for Climate Change (BC3), Alameda Urquijo 4, 4^a, 48008 Bilbao, Spain, ² Universitat Politècnica de València (UPV), Institute of Animal Science and Technology, Camino de Vera, s/n, 46022 Valencia, Spain; elena.galan@bc3research.org*

The information about the effects of climate change in dairy cow farms is made using different scales, methods and regions. This mismatch challenges the reliability of the assessments to implement cost-effective measures of adaptation in farms. Therefore, integration of the available information and uncertainties associated is needed to design effective farm-scale adaptation strategies. In the framework of the ERANET+ project OptiBarn, focused on the adaptation of naturally ventilated barns of permanently housed dairy cows to the effects of climate change, we present a risk assessment for three potential impacts at farm-scale: welfare, economic costs and emissions. We use a Bayesian Belief Network (BBN) to relate quantitatively the information of the effects of climate change described in literature and apply it to conduct scenarios of sub-optimal and optimal housing design of barns in three countries: Germany, Israel and Spain. Using BBN allow us to take into account the biases of the information either due to methodological design, mismatch of scales, unavailable data, unclear causal relationships, etc., and therefore to determinate which is the minimum information needed to take decisions based on our risk assessment. To control for other socio-economic impacts such as milk prices, concentrate prices and non-market values concerning welfare, we perform a sensitivity analysis based on regional data.