Special Issue: Animal housing in hot climates Editorial

Special Issue Guest Editors:

Giovanni Cascone[1], Álvaro Ramírez-Gómez[2]

(1. Department of Agriculture, Food and Environment, Building and Land Engineering Section, University of Catania, via S. Sofia 100, 95213 Catania, Italy;

2. Department of Mechanical, Chemical and Industrial Design Engineering, Technical University of Madrid. Ronda de Valencia 3. 28012 Madrid)

Nowadays, there is still a lack of information on animal housing in hot climates. In the CIGR Section II Board Meeting agenda May 2004, Evora, Portugal was proposed the idea to organize a new working group on hot climate housing. The main objective of this working group is to provide new knowledge on how is possible to reduce animal heat stress and therefore reduce production losses and maintain animal welfare, during hot weather and especially when the relative humidity is high. Since then until now, contributions such as those presented in this special issue have made possible to progress in this specific area providing new information exploring new technologies and proposing new numerical models that can efficiently predict animal heat stress.

The collection of papers presented in this Special Issue is the outcome of the workshop organized by the Working group on Animal Housing in Hot Climates and celebrated within the 8th European Conference on Precision Livestock Farming, 12-14 September 2017, in Nantes.

The paper *ICT monitoring and mathematical modelling of dairy cows performances in hot climate conditions: a study case in Po valley (Italy)* is part of a research that aims to define integrated systems for cow monitoring and to develop guidelines for the optimization of barn layouts. A model able to predict milk yield in a farm in the warm season was developed through a multi-linear correlation approach. In the paper *Use of analysis and processing of digital images for evaluation and control of animal behavior in hot climates,* knowing that the world production of meat is mainly concentrated in countries with a hot climate and that one of the factors responsible of the success or failure of the animal production is the environment (sum of physical and biological factors that affect the animals), the use of digital images analysis of animals is presented to study their behavior, and improve the production system. The animals themselves are used as biosensors in response to environmental conditions. This way the behaviour of the animal can be analysed. In the paper *Engineered solutions for animal heat stress abatement in livestock buildings* through a comprehensive review of research studies two new concepts are put forward; they concern the focus of the analyses on the animal occupied zone (AOZ) and the requirement of environmental homogeneity in the breeding environment for air supply and climate control. Major concerns and solutions are presented. In the paper *Heat and moisture production in growing-finishing pigs and broilers* is discussed the formula previously published in 2002 in the report "Heat and moisture production at animal and house levels" developed within the CIGR Section II-Working Group on Climatization of Animal Houses. Results from the formula proposed are compared with results from a more comprehensive model, the comparison contribute to get a better understanding a progress to efficient predictions. In the paper *Defining upper critical temperatures for an effective climate control to reduce heat stress* practical and effective strategies for the adaptation of animals to heat stress are demanded. It is not only an issue of detecting heat stress conditions but also to establish ways to mitigate their impacts using animal-based information. Integration of animal-based information with environmental information will be essential. In the paper *Effects of Different Cooling Systems on Heat Stress and Behaviour of Dairy Cows* shows the

results of a research that investigates the effects of a sprinkler system coupled with forced ventilation on the heat stress and the behaviour of dary cows. Finally, in the paper *Environmental conditions, potential heat-stress state and their relations in a sheep barn under hot climate* was examined the climate conditions, air quality, potential heat stress and their relations in a sheep barn under Greek hot weather conditions. Measures that could be applied to alleviate animals' heat-stress were proposed.

We would like to thank all authors and reviewers that have contribute to this Special issue. We hope that the results and the information provided will serve as a basis to conduct further research on animal housing in hot climates and generate new knowledge.

Prof. Giovanni Cascone
Member of the CIGR Section II – Structures and Environment and the Working Group on Animal Housing in Hot Climates

Prof. Álvaro Ramírez-Gómez
Chair of the CIGR Section II – Structures and Environment