agronomy

MDPI

Article

Innovative PLF Tool to Assess Growing-Finishing Pigs' Welfare

Vasco Cruz *, José Rico, Diogo Coelho and Fátima Baptista

MED—Mediterranean Institute for Agriculture, Environment and Development & CHANGE—Global Change and Sustainability Institute, Departamento de Engenharia Rural, Escola de Ciências e Tecnologia, Universidade de Évora, Pólo da Mitra, Ap. 94, 7006-554 Évora, Portugal
* Correspondence: vfc@uevora.pt

Abstract: The main goal of the AWARTECH project (Animal Welfare Adjusted Real Time Environmental Conditions of Housing) was to develop an innovative precision livestock tool that will support and reinforce the pig value chain, through the management of solutions based on monitoring, analysis and control of environmental, physiological, behaviour and animal performances parameters. Environmental data was collected by sensors of temperature, relative humidity, air velocity and gas concentration, which are integrated in an environmental control system (Webisense) and in a platform (Nidus). Webisense controlled the ventilation system, the cooling system and the heating system. The rectal and body surface temperatures were registered manual and automatically. In order to monitor the behaviour of the animals, video cameras were installed. An individual feeding machine equipped with a scale has been also installed. This equipment allow, through an RFID system, the individual monitoring and control of the amount of food supplied and ingested; the number and duration of visits; and the animal's weight. The development of the AWARTECH platform resulted from the integration of data provided by Webisense, Nidus, feeding machine and video analytics as well as physiological data. This platform allows the control the environmental conditions based on welfare indicators promoting animal welfare.

Keywords: AWARTECH; animal housing; environmental control; animal welfare; pig

check for updates

Citation: Cruz, V.; Rico, J.; Coelho, D.; Baptista, F. Innovative PLF Tool to Assess Growing-Finishing Pigs' Welfare. *Agronomy* **2022**, *12*, 2159. https://doi.org/10.3390/agronomy12092159

Academic Editor: Peter J. Batt

Received: 11 July 2022
Accepted: 8 September 2022
Published: 11 September 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

1. Introduction

It is expected that the world population will increase about 30% and reach more than 9 billion of habitants by 2050. Consequently, the food demand will increase 70% and human consumption of animal products will double from 258 to 455 million tons [1]. In order to find solutions for this problem, livestock farming systems need to increase production through intensive systems [2]. However, intensive production systems, currently face enormous challenges due to environmental impacts and public opinion. In fact, these production systems, characterized by high animal density, are often seen as inappropriate to animal health and welfare. It is important to raise awareness in the animal production sector about the need to accurately monitor animal welfare conditions within the facilities used in the intensive systems.

One of the most important aspects in the definition of animal welfare is the housing environmental conditions. Environmental control systems in animal housing are very important tools to provide adequate conditions to attain good productivity and animal welfare [3,4]. However, environmental control of livestock facilities is typically based on rates/balance of heat and moisture production at predetermined ambient temperature levels. The traditional control methodology cannot reflect the real animal's needs since it does not account for some important environmental, physiological and behaviour factors (such as air quality, animal body surface temperature or animal feed intake).

In this sense, one of the main challenges for intensive production systems is to monitor and control not only the environmental conditions (microclimate and emissions), but