Jockey Club College of Veterinary Medicine and Life Sciences
in collaboration with Cornell University

Department of Infectious Diseases and Public Health

Precision Livestock Farming – Engineering Strategies and Innovation for Sustainable Livestock Production

By
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Venue: Room 1B-G04, G/F, Block 1B, To Yuen Building

Abstract

As predicted by the United Nations, the global population will likely to reach 9.6 billion in 2050. With about two billion increases compared with the population today, it will be a huge challenge for us to feed the world in 2050. FAO has predicted that the global food production will need increases of over 70% by 2050. On the other side, along with the increasing global demand for animal-source protein, the mounting public concerns over animal welfare have been continually calling for the industries and legislations to improve animal welfare during production. To improve animal welfare, confined animal housing systems, such as the conventional cages for laying hens and individual gestation crates for gestating sows have been banned in EU and some states in the U.S. Instead, alternative housing systems, such as the enriched colony and cage-free aviary housing for laying hens and the group gestation pens for sows are increasingly adopted by the industry. However, with a larger number of animals housed in a larger colony or pen, some new welfare issues appear such as keel bone deformity for laying hens and aggression and lameness for gestating sows. More importantly, the large group alternative housing systems have made it impossible for caretakers to pay attention to each individual animal among the group. The sick or injured animals may not be noticed in time, thus could not be treated properly. In those scenarios, precision livestock farming could play a significant role in terms of improving animal monitoring and assessment, and therefore the animal welfare and production efficiency.

Over the past several decades, extensive efforts have been made by engineers and researchers in developing various automated monitoring technologies what have ultimately formed the concept of the so-called precision livestock farming that promises to increase productivity. The philosophy of precision livestock farming is automated continuous monitoring and managing of farm animals regarding their behavior, health, production, reproduction, and welfare, and their surrounding environments. Objectively speaking, by utilizing wireless sensor networks, cutting edge artificial intelligence, and the leading animal behavioral research, precision livestock farming is transforming the traditional livestock industry all around the world. As an agricultural and biological engineer working on animal agriculture over the past six years, Dr. Kai Liu has been dedicated to applying engineering strategies and innovation and seeking data-driven solutions to address global challenges related to food animal production and sustainability, particularly the ever-growing issues related to animal behavior and welfare. In this seminar, he will talk about his research experiences regarding precision livestock farming (e.g., RFID technology, computer vision, wearable sensors) at Iowa State University and University Pennsylvania.

Biography

Dr. Liu is currently a Postdoc Researcher at the Swine Teaching and Research Center at University of Pennsylvania School of Veterinary Medicine. He received his bachelor's degree in Biosystems Engineering at Zhejiang University in Mainland of China in 2012. Thereafter, he attended Iowa State University in the United States to pursue his doctoral degree with Dr. Hongwei Xin in the department of Agricultural and Biosystems Engineering and graduated in 2017. Over the past six years, Dr. Liu's training and research experiences mainly focused on developing automated monitoring systems for farm animals regarding their behavior, health, production, reproduction, and welfare. Dr. Liu believes engineering strategies and innovation and data-driven solutions could greatly facilitate the sustainability and advancement of livestock production.