

A computer program for monitoring and controlling ultrasonic anemometers for aerodynamic measurements in animal buildings

M. Samer; C. Loebstin; K. von Bobrutzki; M. Fiedler; C. Ammon; W. Berg; P. Sanftleben and R. Brunsch

Abstract

Ultrasonic anemometers (USAs) are widely implemented in animal housing to measure the air velocity in different measuring points throughout the whole barn, which ultimately leads to determine the velocity fields and the air flow patterns drawing a clear vision of aerodynamics inside animal buildings. The problem is the timely inconsistent data transmission from the different USAs leading to varied data recording, which makes the comparison between the recorded velocities in different points timely inappropriate. One key issue is to monitor and control the USAs, meanwhile, debug and record the data. Therefore, LabVIEW 8.5, which is a platform and development environment for a visual programming language, was used to configure a computer program to monitor and control the USAs. The principal functions of the system are represented in a main block diagram which consists of 39 sub-diagrams. Five versions of the program were consecutively developed, and then each version was validated and further developed to get the next enhanced version, and so on till Version 5.0. The evaluation and data recording are carried out simultaneously, where the data are transferred from the USAs to the program which detects accidental errors that may have been introduced during data transmission or storage using a checksum algorithm. The developed computer program has been implemented successfully for monitoring and controlling USAs used for carrying out air velocity measurements in livestock housing. Three measurements campaigns were performed to investigate the air profile inside a dairy barn under two conditions, which are “ceiling fans on” and “ceiling fans off”, where the average air velocities were 0.98 and 0.59ms^{-1} , respectively.

Published In: Computers and Electronics in Agriculture (October 2011), 79 (1), pg. 1-12