A New Method of Computer-Supported Measurements of Distances Moved by Animals

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ABSTRACT

A newly developed software to measure the distance moved by animals under practical conditions was studied in an experiment using a total of 32 piglets. Each piglet, with an age of nine days, was kept under standardized conditions in an open field (OF) for ten minutes. The behaviour was video-recorded using a camera installed vertically above the OF. During the methodological investigation the distances moved were measured first automatically computer-supported by the software EthoVision® (Noldus) and secondly with the special-made software VideoMotionTracker® (Mangold). The analysis of correlation, regression and also the comparison of the means showed a very good correspondence between both methods.

Author Keywords

Locomotion, computer-supported measurement, distances moved, farm animals.

INTRODUCTION

Locomotion defined as the motion of an animal in conjunction with the change of location can allow details about abnormal behaviour, health status and well-being. The existing methods to capture the locomotion of farm animals (e.g. treadmill, pedometer, photoelectric barriers, Local Positioning System – LPS, Global Positioning System GPS, ETHOSYS or video tracking systems) can be used only restricted in conventional housing systems. Automatic tracking systems (EthoVision, Noldus) require high requirements on the identification of the individual animal.

If it is possible to create standardized test conditions these

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programs offer the opportunity to measure locomotion of individual animals computerized [1]. In practice with unequal conditions (light – dark, different materials and backgrounds) it is awkward if not impossible to realize reliable measurements.

The aim of this study was to develop and test a new tech solution allowing computerized measurement of distances moved by farm animals related to group size and other factors of housing.

MATERIAL AND METHODS

The basic requirement to use the new developed software VideoMotionTracker® is the generation of digitalized videos which are recorded by a camera installed vertically above the pen or cage (observation of the whole analysis-area).

Before the measurement can be started the dimension of the pen (length / width) has to be defined in an x-/y-coordinate system. To begin the measurement the examiner has to position the mouse-pointer or alternatively the stylus at a defined point of the test animal.

Figure 1. Camera view of analysis-area in a pig housing unit.

Proceedings of Measuring Behavior 2010 (Eindhoven, The Netherlands, August 24-27, 2010)
Eds. A.J. Spink, F. Grieco, O.E. Krips, L.W.S. Loijens, L.P.J.J. Noldus, and P.H. Zimmerman

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Figure 2. View of a marked test animal.

Following the animal in the pen each movement is drawn as a line and measured as a distance in centimeter at the same time. At the end of the measurement the total distance moved during the time of observation is calculated (e.g. 24 hours).

Figure 3. Distance moved by a pig (example).

Also it is possible to visualize so-called "activity hot spots". With "heat maps" the program can announce the frequency of using different areas in the pen (e.g. feeder or watering place) by the animal.
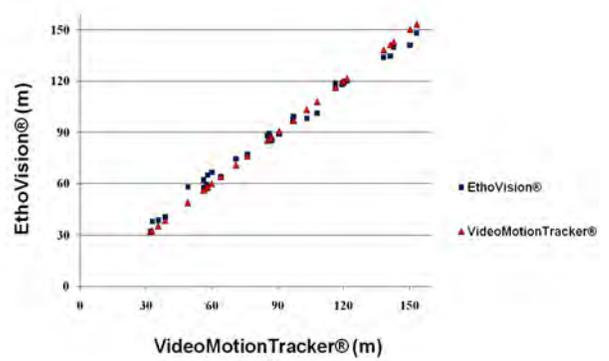

Figure 4. Heat map with activity hot spots.

Figure 5. Comparison of the distances measured with EthoVison® and VideoMotionTracker®.

RESULTS

In methodological investigations, the distances moved by a total number of 32 piglets with an age of nine days under the standardized conditions of an open field during ten minutes (based on digitalized video sequences) were measured first automatically computer-supported by the software EthoVision® (Noldus). Referring to the automatic measurement the same 32 piglets were analyzed with the special-made software VideoMotionTracker® (Mangold). The results of the comparison of the means (EthoVision® 91,3 m; VideoMotionTracker 91,4 m) showed a very good correspondence between both methods. Furthermore, the correlation analysis (r = 0,997) showed a highly significant coherence.

CONCLUSION

With the VideoMotionTracker®, a method is available to measure the distance moved by animals during a defined period of time (e.g. 24 hours). The precondition for this computer-supported measurement is that the whole area can be video-observed. In combination with infrared technology the program can also be used to analyze the behaviour of nocturnal animals.

Based on the present results various fields of application in ethological research are conceivable in the future.

REFERENCES

1. Lind, N.M., Vinther, M., Hemmingsen, R.P., Hansen, A.K. Validation of a digital video tracking system for recording pig locomotor behavior. *J. Neurosci. Methodes*, *143* (2005), 123-132.