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COMPUTER SUPPORTED MEASUREMENT OF DISTANCE MOVED BY RABBITS A DAY BY MANGOLD VIDEO MOTION TRACKER

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1. INTRODUCTION

Rabbits are kept to a large extend in intensive husbandry systems, mainly in cages with wire nets or slatted floor. The housing of farm animals is related to health, hygienic, behavioral and economical aspects. Different behavioral patterns may be used to evaluate the housing conditions of farm animals. The presence of abnormal behavior may indicate some problems for the animals caused by inadequate keeping conditions. Parameters of acute loading or stress may be evaluated looking at behavioral patterns such as feed intake or social behavior. Ethological observations can lead to results and assessments concerning changes or disturbances in behavioral parameters caused by inadequate environmental conditions as far as the „normal” behavior are known. Related to group size, stocking density, space allowance, total pen area and other factors of housing the question has to be answered which distances are moved by the animals a day or during periods of activity or during a raising or fattening period. Existing technical solutions (e.g. EthoVision, Local position measurement) are not suitable under practical circumstances. So, the preconditions for the use of EthoVision are the well defined environment (preferably the provision of an open field chamber) and the single actor in it. Small differences in the background color or the existence of „black and grey strips” on the floor (in case of slatted floor housing of animals) may disturb the automatic registration of a distance moved by an animal. The local position measurement technique is only developed for the use in cows or other large animals with some technical restrictions. For example, there is the need for the use of heavy batteries which have to be exchanged every 4

hours. There is no possibility to install an antenna or other equipment directly at the body of a pig or a small laboratory animal like rabbit, rat or mouse. It is possible to use an electronic ear tag for the individual registration of a sow or a rabbit doe (RUIS 2006). But, this electronic device is not suitable for a local position system.

2. MANGOLD VIDEO MOTION TRACKER

Because of the reasons described above it was necessary to develop and to test a new software solution to analyze the distance moved by farm animals in the field (e.g. in a farm). The Video Motion Tracker by Mangold is a computer supported tool (fig. 1) which can be used easily. The basis for its use is a digitalized video which is recorded by a camera installed vertically above the pen or cage. In our case, the video recording equipment consisted of an IR camera with an aspheric lens, an IR lamp and a time lapse video recorder described by HOY (1998, 2000).



Figure 1: Video Motion Tracker on tablet PC

The dimension of the pen (length, width) has to be defined in the program. We tested the Video Motion Tracker in a cage with a dimension of 1 x 1 m (fig. 2).

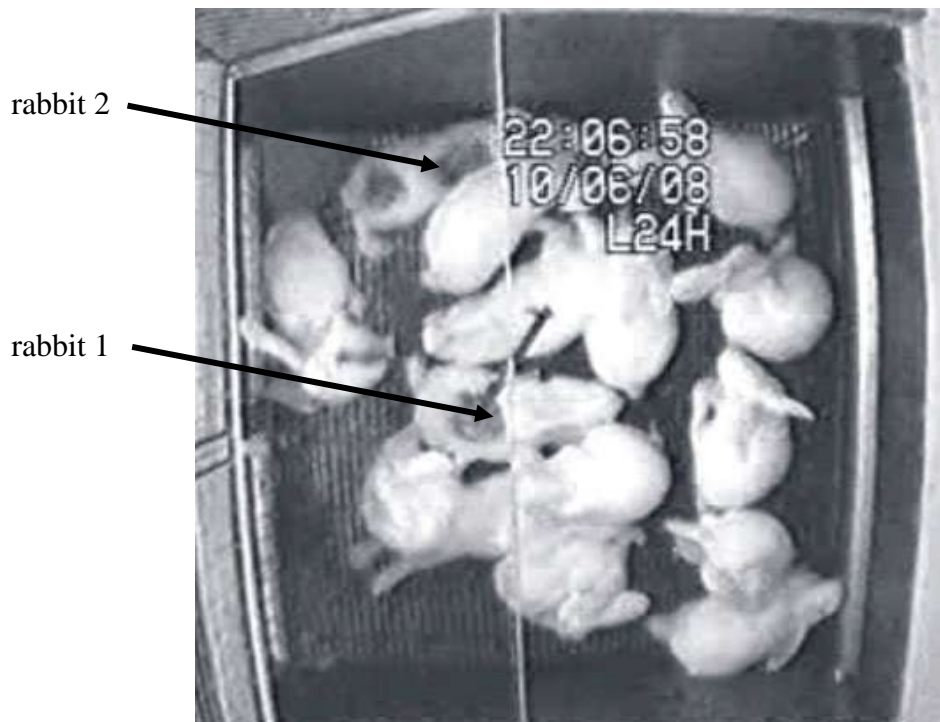


Figure 2: Cage for 16 rabbits

3. USE OF VIDEO MOTION TRACKER

After the start of the measurement procedure, the distance moved by an animal in an x-y-coordinate system can be tracked with the mouse pointer or the stylus on the touch screen of a tablet PC (fig. 3). With the mouse pointer or the stylus following the animal on the screen, each movement of the animal is drawn as a line and measured as a distance at the same time. At the end of the observation, the distance moved for example during an hour or a day is summarized.



Figure 3: Use of Video Motion Tracker

It is also possible to calculate the distances moved during the light period or during darkness. There is also the possibility to stop and continue the measurement at any time or position. The distance moved until this time or position is shown on the screen. It is possible to go through the digitalized video file with different speed options. Additionally, the Video Motion Tracker visualizes so called activity hot spots. By clicking on the button a heat map is shown. The hot spots represent the frequency of the use of the cage areas by the animal observed. That way the zones where the most activities took place in a cage or in a pen or in the arena observed can be illustrated (fig. 4).



Figure 4: Heat map with hot spots of activity

4. FIRST RESULTS

The Mangold Video Motion Tracker was used first time in growing rabbits kept in a group of 16 at a space of one square meter. Two rabbits were marked as focus animals and observed in the middle and at the end of the 8 weeks lasting raising period. A camera WV-BP 330 (Panasonic) was installed above the cage and connected with a time lapse recorder (AG-TL 350). An infrared lamp emitting a non-visible light with a wave-length of 880 nm enabled the video observations during the night. The time lapse VCR made it possible to record the behavior during 24 hours on a 180 min video tape. The video tapes were digitalized using the software Canopus Media Cruise. The video files were opened with the Video Motion Tracker and the measurements took place as described. In the middle of the fattening period with an age of 9 weeks the two rabbits moved 182.9 m, 232.1 m respectively a day. At the end of the period with an age of 12 weeks the daily distance moved by the two rabbits was 98.8 m, 119.9 m respectively.

Table: Distances moved a day (m) by two rabbits (in a group of 16 kept on 1 m²) in the middle and at the end of an eight weeks lasting fattening period

in the middle		at the end of the fattening period	
rabbit 1	rabbit 2	rabbit 1	rabbit 2
182.9	232.1	98.9	119.9

It can be seen that large differences occurred between fattening periods and also between individuals. The system is generally suitable to be used in ethological research. The Video Motion Tracker might be applied for different purposes and in different species with special focus on small animals (e.g. pigs, rabbits, rats, mice, poultry). Different questions could be answered using the new software: Which distances are moved by the rabbits in dependence on space allowance, stocking density, group size, rank position, sex, age, weight and other factors. Similar questions arise in housing pigs and could be answered by the Video Motion tracker.

5. CONCLUSION

It is possible to measure and to evaluate the distances moved by animals in general and rabbits in particular with the Mangold Video Motion Tracker. The software can be characterized as a new tool in the Applied Ethology with a lot of possible applications. The Video Motion Tracker supports the assessment of housing and feeding systems for farm and laboratory animals under the aspect of animal behavior.

6. LITERATURE

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