ASPECTS RELATING THE MEANS OF VIDEO RECORDING IN LIVESTOCK RESEARCH

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Abstract

Using video recording surveillance systems in livestock research has a number of advantages: it confers privacy to animals which are undisturbed by human presence, it is a factor reducing the human effort especially in 24-hour surveillance, greatly reduces errors in further analysis and increases data verifiability. This work is a synthetic analysis of three video surveillance systems, technical data analysis and results obtained from testing them for 30 days in different conditions at three livestock holdings. Each system has advantages and disadvantages, such as data storage capacity, recorded data transfer method and data transferability from the system to the data processing unit. A very important aspect is the system sensitivity of sequenced data analysis under natural, artificial and infrared light. Sequence analysis of the data is an intelligent (clever) way of these systems by which we are able to adjust specific action-sensitive areas for filtering information insignificant to the research. Video surveillance system is an advantage in livestock research, the right choice and proper function adjustment helps further data processing. Information resulting from the synthesis of the three systems and data obtained from use provides practical information for applying these systems in research.

Key words: video surveillance, data processing

INTRODUCTION

Use of video surveillance systems in the research activity facilitates the work of researchers observing the individuals, provides data point excluding mostly human errors that occur especially where surveillance is carried out over a longer period of time.

Use of the systems is effective and eases researchers work but rises a number of technical problems which occur at system installation up to analysis of the data obtained, some of them can influence the results of research.

This work is a synthetic analysis of three video surveillance systems, technical data analysis and results obtained from testing them for 30 days in different conditions at three livestock holdings.

Each system has advantages and disadvantages, such as data storage capacity, recorded data transfer method and data transferability from the system to the data processing unit. A very important aspect is the system sensitivity of sequenced data analysis under natural, artificial and infrared light.

Choosing the correct and proper adjustment of functions helps further processing of data, information derived from synthesis of the three systems and data obtained from use provide practical information for applying such systems in research.

MATERIAL AND METHOD

Within the research of the nutritional behavior of young horses, a project to be carried out at three holdings in Covasna County, for the observation of newborn individuals there have been installed three video surveillance systems carried out by three producers in the industry with approximately alike features. Each of the three systems have functioned satisfactorily but required various adjustments and settings in order to obtain the data interesting in terms of the research, adjustments which can bring significant help in further processing of data. Specific aspects relating to the quality, as

well as archiving and transferring data from the capture unit in the processing unit of the data rise specific problems in each system. Sequential recording reduces the motion detection sensitivity that won't work very well in areas with lower light. Data archiving requires a relatively high capacity of archiving, meaning several terabytes. Reducing the number of images recorded every second reduces storage capacity requirements to the detriment of the individual moving details, and reduces the sensitivity of the detection system activity. Each system has the ability to record without interruption, causing a very large database by consuming a lot of the storage capacity of DVR (Digital Video Recorder) and increases the volume of material to be processed. Systems used: two DVR systems, and a GeoVision system, embeddable card.

DVR systems have the advantage that they are compact, have a relatively simple soft, take up low space, and the disadvantage of relatively complicated data transfer to the data processing unit. GeoVision system requires a higher initial investment, requires a computer, the advantage is ease of access to your data without data transfer. For this system the motion detection is good even in low-light situations. The cameras at these video surveillance systems are generally medium resolution: 720x480 dpi with a lens with aperture F1.2 with a viewing angle of 70 degrees, the operation during the night was made with leds in infrared field to ensure operating up to 15 m.

DVR's that are used have four video recording channels and system GeoVision has eight video channels. For the purpose of improving working capacity video cameras can be used as a source of light with LED panels specially designed for infrared field.

General characteristics of the schemes are listed in Table 1. The memory requirements on the basis of resolution and the recording speed are presented in the Graphic 1.

Table 1. DVR features

DVR	Port cam	System	Supports HDD	Format	System
M 70 C	4	Pal	1 Tb	4:3	Compact
H 246	4	Pal	2 Tb	4:3	Compact
GV 250	4	Pal	Unlimited	4:3	Card

(1), (2)
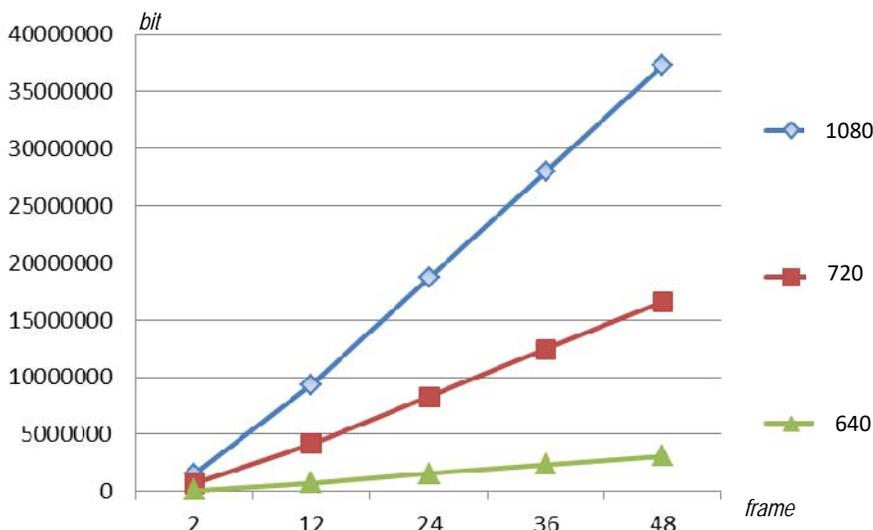
Graphic 1

RESULTS AND DISCUSSION

Research linked to the nutritional behavior of youth horse, monitoring individuals from parturition up to the age of 30 days required video monitoring under the arrangements for 24 hours. They were monitored ten foals in farrowing crates, and from the early days of recordings several technical/adjustment issues have been encountered which have been removed on the way.

Since the preparatory phase of research, at the phase of installation of surveillance systems, knowledge of camera functioning helps to avoid malfunctions/errors. The reception of the signal must be located at a place as possible dust-free, the HDD which will store information must be designed to operate 24 hours (intended for the function of server). Tracking individuals in regime of 24 hours for 30 days at 10 individuals involves a volume of 7.200 hours video material which in its resolution of 720x480 pixels of recording arrives at a volume of about 250Tb.

Video monitoring systems have the ability to adjust recording speed from 2 fps to 50 fps, functions which influences recording quality. Another handy feature is motion detection recording. To achieve a reduction of the amount of records and save space has been tried speed reduction of capturing images and, at the same time activating function of detection of motion. In all the three systems used, to the extreme minimum of 2 frames/s, the detection function of the movement in the field of mid and low brightness (shadow from panels) in particular in the situation where the mare was of a light color and a dark-colored colt, has not given satisfactory results, even in a situation in which it was going to take it from adjusting camera detection surveillance (set to less contrast).

Auto-sensing function of the movement worked satisfactorily from the recording speed of 15 frames/s, it is noted that each camera requires individual contrast adjustments to optimize system performance. Regarding the characteristics of safety cameras (Table 2) the used angle of view is 70 degrees, for total coverage of the space of observation they tried several variants of placing the cameras. A single camera located for supervising a crate does not have satisfactory results because of uncovered areas.

Table 2 Surveillance system features

Camera	Sensor	Lens	Angle	Diaphragm	Ambient	Led
CA 116	Cmos ¼	6 mm	70 degrees	F 1,4	Exterior	6-10 m
SE 710	Cmos ¼	6 mm	70 degrees	F 1,4	Exterior	20 m

(2) (3)

In the version of cameras mounted diametrically opposed the results are satisfactory, the analysis must take into account that the same individual appears simultaneously on two images. Supervision of two crates with three rooms can minimize not covered areas, with low significance as crate corners, but also has the disadvantage that requires higher attention to analysis of the data for that on one of the images may appear two supervised individuals.

A very important aspect is clean lens and infrared panel (glass cleaning wet paper brings good results), which can lose 20-30 percent capacity in 24 hours, practically in two-three days the accumulations of particles on the surface of the lens may damage the image and disturb the motion detection.

Infrared panels can be successfully used to supplement LED which is incorporated in the camera. Choosing the place for installing these panels will be carried out with caution to avoid areas with high contrast, where the motion detection is weaker.

DVR units must be kept free of dust and because of signal loss it requires a maximum distance of 20 m to the furthest camera.

CONCLUSIONS

Surveillance systems can be used with good results at the monitoring individuals under observation in livestock research.

Compact systems have the advantage of easier handling but further processing of data is more difficult, as well as motion sense auto power is less sensitive. Out of the three systems tested GV 250 worked best, but has the disadvantage that requires a computer for operation. The M70 C and H246 worked satisfactorily after specific adjustments.

In situations where infrared panels were used to supplement built-in LED's, the nocturnal image quality was better.

Storage media is a value of approximately 60% of the equipment value, if the proposed experiments are very important or may not be repeated, it is advised to use hard drives for servers.

Brightness and Contrast settings and also inadequate maintaining can compromise the results of the records.

Appropriate and detailed adjustments and sequential function with automatic start recording on motion detection can significantly reduce the amount of material recorded without loss of important data in terms of research. In our case it came from 7200 hours of records to approximately 3200 hours factual records, thus saving time and storage capacity of about 55 %.

ACKNOWLEDGEMENTS

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