

Study of the cattle population with the help of remote digital photography and videography

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GOAL OF THE STUDY

This article examines the possibility of recognizing the individual biological units of a specific cattle population, determining their number and physical condition from digital images, using software solutions and systems on a particular pasture.

INTRODUCTION

The main argument in research conducted on populations of different species of animals is animal welfare. The introduction of innovative methods and systems for monitoring [1,2], control and optimization of the cattle population is the only correct approach to increase productivity in the field of dairy production and cattle breeding. Remote determination of the number and physical condition of biological units is essential in animal husbandry. Visual tracking of biological units and the use of digital images to determine key indicators and characteristics of entire herds of animals is increasingly used. The aim of this study is to investigate the potential of intelligent methods for tracking cattle populations.

MAIN RESULTS FROM THE STUDY

At the first stage of the research the method was used by using an unmanned aerial vehicle and aerial photography of digital images of biological units. During the study, the unmanned aerial vehicle was raised at different altitudes in the range of 30 to 50 meters, and the time for video recording of the movement of the biological unit is at different intervals (fig.1). When shooting from a lower, which is more appropriate, the herd of cows is initially intrigued by the noise and type of drone, but after a while the animals are afraid of noise, which causes anxiety and irritation in which the cows run away in different directions of the studied pasture.



Fig. 1. Aero images of cattle and Regions of interest for determining the temperature distribution of cattle.

Thermo diagnostics is a study that provides information for a timely response and can localize many diseases at an extremely early stage. The use of thermo-visual diagnostics in the process of breeding cattle considering the temperature deviations will improve the welfare of both individual cattle and whole herds of animals. Temperature anomalies in the bodies of all animals accompany all types of diseases: bacterial, viral, traumatic, oncological and others.

The normal temperature for cattle is 37.5-39 °C. Small deviations up or down are allowed, which are explained by the individual characteristics of the organism. The body temperature readings of young calves differ from those of adult animals and vary with the age of the calf.

Table 1. Measured results of the cattles

Age of the calf	Temperature °C
2-6 weeks	38,5-41 ° C
Up to 2 months	up to 40,2 ° C
Up to 1 year	up to 40 ° C
More than a year	37.5-39 ° C

Images from the field test, as well as the variations in the heat flux of the biological unit during the study are presented in Figure 2.

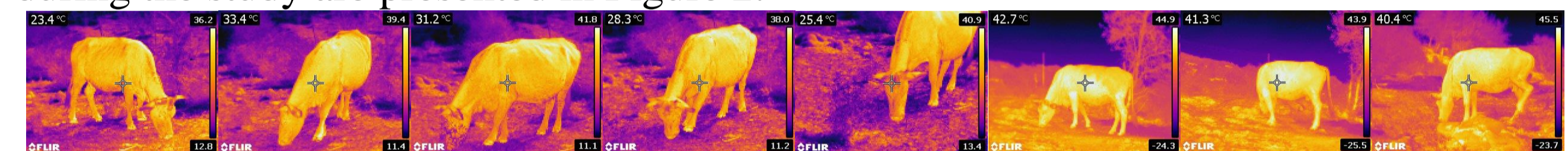


Fig. 2. Variation of cattle temperature distribution

From the point of view of the health condition of the cow it is more important to study and analyze the distribution of temperature both on the whole body and on the individual limbs, muscles, organs, etc. This distribution is directly influenced by the activities and functions of the organs of the body and can give a clear idea of the overall condition of the animal and its specific organs. For this purpose, areas of interest are selected to monitor and analyze the temperature distribution of the cow's body. Since the study of individual organs and parts of the cow's body is a multifaceted task, several specific points from the cow's figure will initially be selected, as shown in Figure 1.

As mentioned in the above work, body temperature is a key indicator by which the health status of a biological unit can be determined. It is necessary to accumulate a large database of measurements of the temperature of individuals in the herd to determine pathological changes in their bodies, especially since the body temperature of cattle changes with the age group in which it falls.

CONCLUSIONS

After performing the initial experimental study, some general conclusions can be made:

It is necessary to accumulate a large database of body temperature distributions of cows according to the age group in which they fall.

It is necessary to accumulate a large database of digital images to determine the behavior and emotional state of each animal individually and the well-being of the whole herd.

It is necessary to use a more specialized drone, emitting low noise levels (so as not to subject the cows to stress during the flight on them) and if possible equipped with a thermal camera, which will provide the ability to simultaneously capture images of the studied population of cows.

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