*Vыvedenы equation of motion materyalnoy particles on the surface of a flat disk and konycheskoho, kotorыe vraschayutsya Around vertykalnoy wasps in pryamouholnoy polyarnoy and Cartesian coordinate systems. Poluchnnыe equation pass into each other, as well as in the equation of motion for particle surface vraschayuschehosya cylinder, confirms something s accuracy.*

***Movement, materyalnaya particles, disc.***

*Equations of motion of material particles on surface flat and conical disks that rotate around vertical axis, in rectangular cartesian and polar coordinate systems. Findings equations transfer in each other, as well as in equation of particles on surface of rotating cylinder that confirms their authenticity.*

***Motion, Material particle, Disk.***

UDC 637.1

## DIAGNOSTIC SYSTEM physiological state COW BASED EVALUATION its mobility

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*Describes ways of solving the problem of diagnosing the physiological condition of the animal, such as diseases of the extremities, based on evaluation of its mobility. The application system videoanalizu based sensor camera «Kinect» with infrared light as a means of building maintenance diagnostic system.*

***Diagnosis, disease of the extremities, Kinect, mobility system.***

**Problem.** Diseases limbs often observed in cows and farms cause noticeable damage. Research [1] found an average herd structure in stages limb disease according to the proposed scoring (Table. 1), which is shown in Fig. 1.

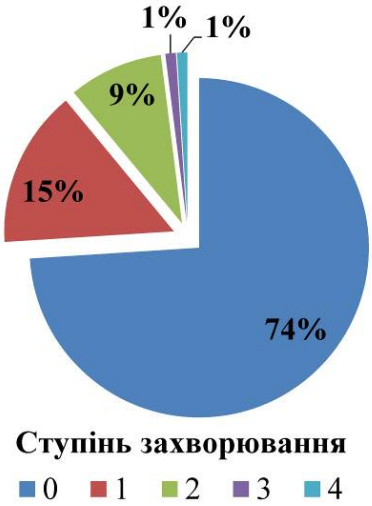
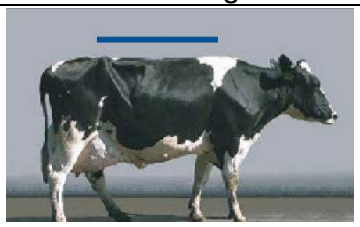
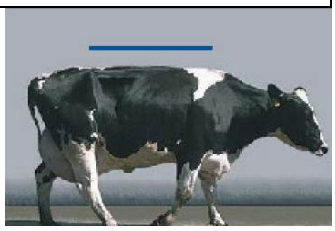
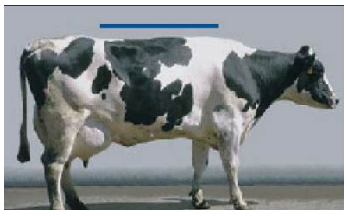
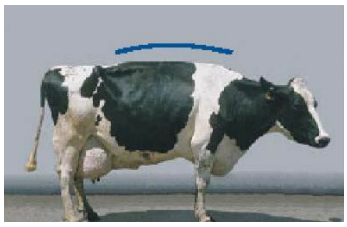
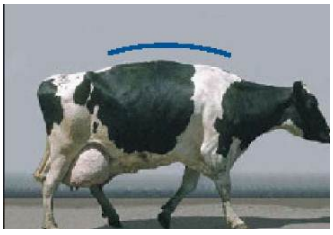
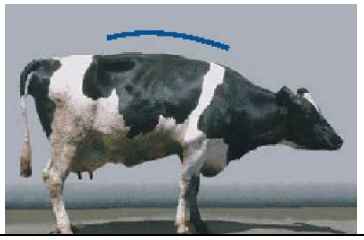
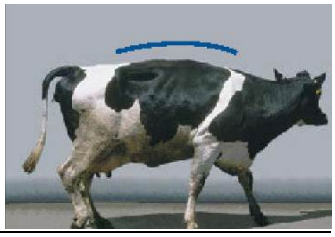



Fig. 1. Structure of the average herd-stage disease extremities.

***1. The scoring limb disease in cows.***

| Degree | Rating | The situation back when | |
|---|---|---|---|
| | | standing | walk |
| 0 | Normally. A cow stands and walks with a smooth back. Gait is normal. |  |  |
| 1 | Weak lameness. The cow is back with equal, but while walking back arched. |  |  |
| 2 | The average claudication. A cow stands and walks with a distinct curved back. When walking makes short steps. |  |  |
| 3 | Lameness. The back is always clearly curved. The animal is almost steps on one or more limbs. |  |  |

***Extension Table. 1***

| Degree | Rating | The situation back when | |
|---|---|---|---|
| | | standing | walk |

| | | | |
|---|---|---|---|
| 4 | Acute lameness. Cow shows inability or unwillingness extreme attack against one or more limbs. |  |  |

Research [2, 3] found that every case of lameness on average is a loss of 320 €, which includes lost productivity of cows, their rejection, loss of weight, increased spending on treatment (Fig. 2).

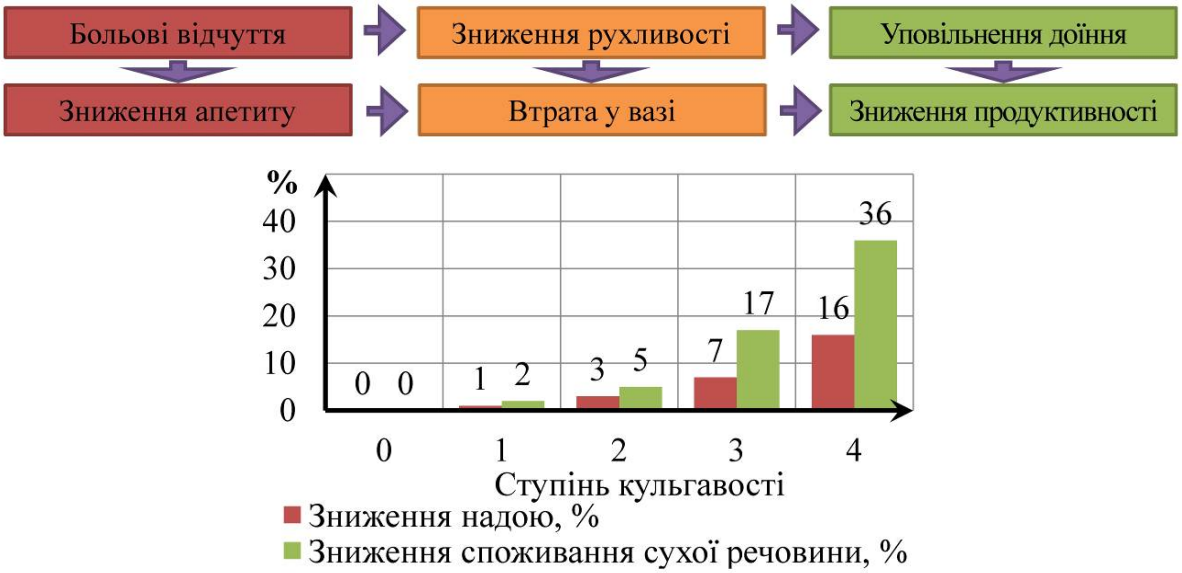



Fig. 2. OUTCOME limbs cows [2, 3].

This problem is particularly acute in terms of specialization dairy, due to the abrupt change of feeding and housing of animals. The causes of diseases hooves are a variety of mechanical damage with subsequent penetration into living tissue pathogens. Contributes to this pathology concentration of animals in a limited space, poor quality floors, lack of exercise, violation of sanitary norms, unbalanced feeding, and plays an important role and rock factor.

**Analysis of recent research.** To address the disease limb cows need of constantly diagnose their condition. The study [4] showed that regular evaluation of mobility allows the cows in the early stages to recognize subtle lameness with an accuracy of over 80%. The latest technology of lameness based on the use of pressure sensors are characterized by 60-70% accuracy, and therefore can not compete. And it is - an additional motive to develop new algorithms and automated systems for visual detection of lameness.

Automated systems to record the coordinates of the characteristic

points of the skeleton of an animal in motion offline aimed at studying such a complex physiological process, like walking. Walking, as a special type of locomotion in the exercise which involved the entire musculoskeletal system of the animal, was the main focus in the theory and practice of clinical analysis of movements. Vulnerable links of this practice is dependent assessment (diagnosis) on the accuracy of their own interpretation of empirical observations. The main limitation of the visual analysis due to the impossibility of simultaneous and continuous observation of the different parts of the animal in motion. Observations conducted only one point of view, can cause errors in interpretation, especially because the human eye is often "miss" some important nuances movements that occur faster than the second. Inability to obtain accurate and comprehensive quantitative data often led to what experts had to rely solely on their intuition when making such decisions, such as the need for surgical intervention. The situation changed with the emergence of a number of modern technologies to retrieve most of the facilities required for quantitative studies of motor function. These technologies are allocated motion analysis system, or system videoanalizu (known as motion capture - movement registration system) [5]. The principle of operation of such systems is to create a three-dimensional model by shooting a moving body of the animal with the possibility of mathematical analysis of key aspects of locomotion such as joint angles, angular velocity and acceleration (in kinematic analysis) calculations support the forces of reaction, the moments of forces in the joints and energy (with dynamic analysis).

Use of videoanalizu movement allows to obtain objective and accurate quantitative data of visual interpretation, which affects the quality of decisions, so it is possible to diagnose in the early stages of the disease in cows limbs and carry out the appropriate veterinary measures to address them.

**The purpose of research.** To develop a diagnostic system of physiological condition of the animal, such as limb disease, based on the assessment of mobility.

**Results.** Thus, the use of modern platforms videoanalizu is a promising and important direction in diagnosing the physiological state of the animal, in particular for the diagnosis of diseases of the extremities. One such platform is the video analysis sensor camera «Kinect» (Fig. 3).

Fig. 3. Appearance sensor camera «Kinect».

Features sensor camera «Kinect» software libraries using Microsoft Kinect for Windows SDK [6, 7]

– recognition and tracking one or two objects moving in the field of sensor using tracking parts of the skeleton;

– determine the distance from the sensor to the object using infrared sensor data stream depth.

According to the plan of research and development work in 2011-2015. On "investigate biomechanical laws creating energy efficient processes and hardware maintenance cattle» (№ DR 0111U004413) conducted laboratory experimental study of geometric and kinematic parameters of the movement of cattle videoanalizu using systems based on sensor camera «Kinect» with infrared light (Fig. 4).

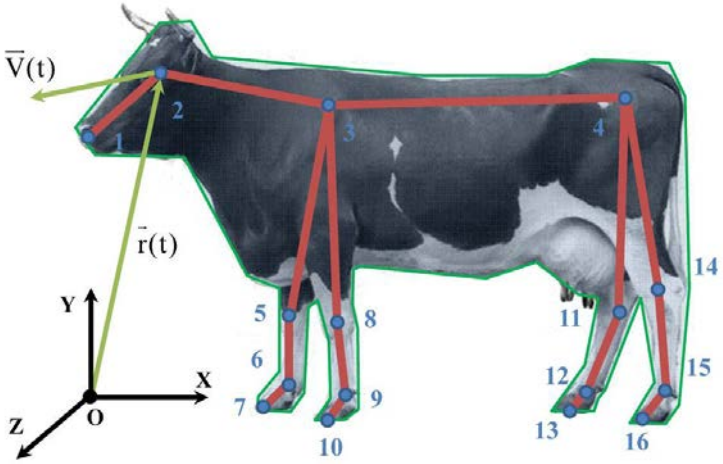



Fig. 4. Result videoanalizu tracking system based on sensor camera «Kinect» to determine the geometric and kinematic parameters of the movement of cattle.

With the use of three-dimensional modeling «Autodesk 3ds Max» and vector calculations developed an experimental 3D-model of a cow and its kinematic parameters calculated standard distance, location, trajectory, velocity graphs (Fig. 5). Defined kinematic parameters of the standard motor behaviors age and productive livestock groups at rectilinear motion and another that used in circuit design and technological equipment for the diagnosis of physiological and clinical condition of cattle in dairy cattle management system.

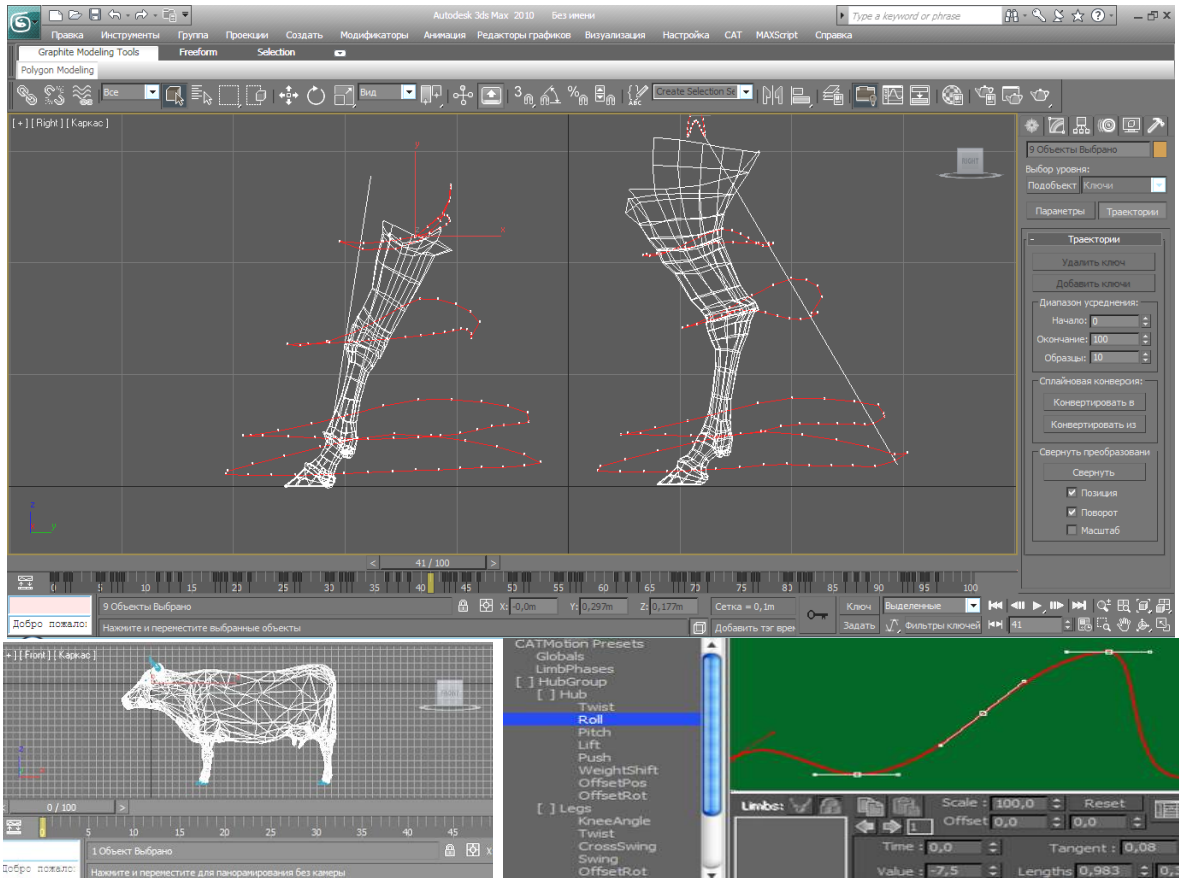



Fig. 5. Experimental 3D-model of a cow and its kinematic parameters of the standard distance, location, trajectory, velocity graphs.

**Conclusion.** Developed an experimental model of the diagnostic system of physiological condition of the animal, such as diseases of limbs, based on the assessment of mobility using sensor camera «Kinect» and three-dimensional modeling tool «Autodesk 3ds Max».

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*Path is set out solutions Problems of diagnosis physiological STATUS animal, namely disease limbs, based otsenki podvyzhnosty ego. Using Obosnovano system vydeoanalyza in Bazet sensor-камеры «Kinect» ynfrakrasnым with radiation in kachestve tehnycheskoho sredstva dyahnostycheskoy building a system.*

***Diagnosis, disease limbs, Kinect, podvyzhnost system.***

*The* way *of problem's solving of diagnosis of animal's physiological condition, namely limbs' disease, based on an assessment of its mobility is expounded. Use of a video surveillance system based on sensor cameras «Kinect» with infrared radiation, as a technical tool for building diagnostic system, is grounded.*

***Diagnosis, diseases of extremities, Kinect, mobility of system.***

UDC 631.31

## Theoretical study of the interaction of working bodies subsoil with soil

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* Supervisor - PhD IA Shevchenko



*The resulting mechanical-mathematical model of the interaction of the working body subsoil with soil. Ante stress resistance and road jams ground for its different layers.*

***The soil, subsoil, mechanics and mathematical model, the stress state, jam.***

**Formulation of the problem.** Mechanical tillage plays equally important role in the formation of the crop in all soil under normal weather conditions. Machining of soil - a process of interaction between agencies working machines (guns) and soil. Mechanical tillage means that the soil is deformed by the forces that occur during the interaction of working tools from soil. in the creation of tools can change the size and shape of the surface of the work, hence the forces acting on the ground.