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## **Анотація**

### **Визначення швидкості потоку необхідного для перемішування гною**

Кольга Д.Ф., Костюкевич С.А., Назаров Ф.І., Булак Н.В.

*У статті наведено закономірності, що дозволяють визначити швидкість руху твердих частинок гною при перемішуванні.*

**Ключові слова:** рідкий гній, міксер, частини, швидкість.

## **Abstract**

### **Determination of the flow rate required to mix the manure**

D.Kolga, S.Kastsiukevich, F.Nazarou, N.Bulak

*The article presents the regularities that make it possible to determine the speed of movement of solid particles of manure when mixing.*

**Key words:** liquid manure, mixer, parts, speed.

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## **BIOTECHNOLOGICAL METHODS FOR THE DEVELOPMENT OF ANIMAL HUSBANDRY**

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The article analyzes the agrarian enterprises business processes management and enterprises which providing their activity, based on the digitization technologies and other innovative solutions. High rates of technological and technological upgrades for their implementation require constant monitoring and implementation of innovative solutions in the agricultural management field and established economic links with organizations, which create and spread such innovations.

The innovation implementation in a broad sense contributes to the labor productivity growth, saving resources, reducing costs, increasing production and sales, and improving efficiency.

We propose to consider the digitalization technologies application in embryo transplant enterprises (laboratories) that provide agricultural enterprises with cattle

embryos [1]. The software, in combination with the biotechnology laser embryo division system, allows authors to automate the process and ensure its high quality, and the mathematical model formalization - to transfer the process methodology to almost all areas of animal husbandry. The result within Ukraine is the livestock herds restoration and higher productivity level transition in the direction of the slaughter weight and milk yield increasing, and improving the corresponding indicators of enterprises, industry, economy of the country. Such technologies form the requirements for agrarian management system, a qualitatively new level of professional education and behavior of specialists, which motivates to the end result. The formation of the agrarian management system as a whole requires the digitalization tools involvement in the process of innovations implementation. Thus, embryo transplant enterprises (laboratories) can and should make extensive use in addition to special (surgical) equipment and state-of-the-art laser equipment, digital equipment, software, IT tools [2].

The state of embryo transplantation technologies development in animal husbandry and its improvement possibility through biotechnological processes automation and digitization with the use of a laser embryo division system allows increasing the process' quality indicators. The system consists of a source of laser radiation, collimating optics, a rotating mirror, a focusing optical system, an inverted microscope and a device. This device provides the functions of digitization of the biotechnological process and management of the viability of cattle embryos for agricultural enterprises. The system consists of: a laser radiation source, a collimating optics, a rotating mirror, a focusing optical system, an inverted microscope and a device. This device provides the biotechnological process digitization functions and the cattle embryos viability management for agricultural enterprises. Algorithms that visualize the process of laser control and laser beam focusing are implemented by computer software. It is the "brain" of the biotechnological system and requires optimization of all system components' parameters.

Therefore, authors have solved the problem of technical means operating parameters optimization by biotechnological process automation and digitization means of elite farm animals' embryos laser division. The thermal stability (viability) of the resulting embryo portions is ensured by controlling the parameters of the moving radiation source and the embryo temperature field limitations. The quality functional of the embryo division biotechnological process is formulated with the laser system help, which allows to take into account the basic parameters of this process and to offer its optimality criterion. The formalized parameters constraints system of the laser embryo division biotechnological process provided the opportunity to move to the operating parameters values substantiation of the technical means, which provides quality embryo division biotechnology based on the laser system. The hardware implementation of the laser division method of early embryos in animal husbandry and the software developed application on the mathematical model basis on bioobject laser beam trajectory optimization of software allow increasing the accuracy of focusing.

The research results practical significance, proposed methods, mathematical models and tools is to create the conditions for the industrial breeding technology implementation and reproduction Ukraine's livestock.

In fact, the digitization of this process in the sense of device control that improves the embryo fission quality by implementing algorithms for laser beam control visualization and focusing accuracy.

At the corporate executives' level, there is an awareness of the importance and expanded production regularity, increasing profitability through the innovations implementation, whose key function in the agrarian management system is to create conditions for innovative receptivity to all types' innovations implementation, including digital technologies.

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## Анотація

### Біотехнологічні методи розвитку тваринництва

Левкін А.В., Котко Я.М., Левкін Д.А.

*В роботі розглянуті деякі питання застосування автоматизованих систем управління на підприємствах з трансплантації ембріонів для підвищення ефективності функціонування біотехнологічної системи лазерного ділення ембріонів великої рогатої худоби.*

**Ключові слова:** автоматизовані системи, математичні моделі, задача оптимізації.

## Аннотация

### Биотехнологические методы развития животноводства

Левкин А.В., Котко Я.Н., Левкин Д.А.

*В работе рассмотрены некоторые вопросы использования автоматизированных систем управления на предприятиях по трансплантации эмбрионов для повышения эффективности функционирования биотехнологической системы лазерного деления эмбрионов крупного рогатого скота.*

**Ключевые слова:** автоматизированные системы, математические модели, задача оптимизации.