ON THE ISSUE OF AUTOMATION OF POULTRY MEAT FARMING FOR SMALL AND FAMILY BUSINESSES IN UZBEKISTAN

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ABSTRACT
The technological process of meat poultry farming in Uzbekistan has been investigated and analyzed. The parameters of the technological process of meat poultry farming, as well as the parameters of controlled and uncontrolled processes and their regulation have been determined. An algorithm for automatic control of the control process and a logical diagram of systems for automatic control (regulation) of a technical process are given.
KEYWORDS: *meat poultry, broiler, technological process, automation, temperature modes, humidity, lighting, feed.*

INTRODUCTION

In Uzbekistan, a reform was carried out in agriculture and agricultural production was transferred to the private sector in the hands of farmers and dehkans, as well as entrepreneurs of different levels and opportunities.

Poultry production is carried out by the private sector and farmers, as well as small-scale farmers and family farms.

For this stratum, the poultry farming population is one of the natural, objectively determined economic profitable areas of the successful functioning of the meat complex in all regions of the country.

Especially noteworthy are the effective measures of state support, stimulating the modernization and development of the poultry industry, subsidizing interest rates on loans, sectoral programs for the development of poultry farming in Uzbekistan, support for breeding organizations, and other regulations.

The basis for the development of the poultry industry, an increase in the volume of finished meat production is the decree and decisions of the President of Uzbekistan on "Additional measures for the intensive development of poultry farming dated 13.11. 2018 ".

The decree states that for the intensive development of the industry, it is necessary to introduce modern technologies, modernize, automate the production of poultry meat and increase the volume and geography of exports of finished products. The development of poultry meat farming in Uzbekistan was facilitated by favorable market factors in general: a high and stable consumer system for the relative cheapness of dietary poultry meat;

Investment attractiveness of the industry (fast capital turnover and high return on investment). The high economic efficiency of this industry is mainly due to the early maturity of poultry, a short production cycle and low production costs [1].

The production of poultry meat in the world approached the level of 100 million tons. The average annual growth rate of poultry meat production over the past 50 years was 5%. In the future, the specific share of poultry meat in the total balance of meat consumption in the world will dynamically increase. World production from 1950 to 2009. Meat is steadily growing. The highest growth rate for the same period was the production of poultry meat 10.8 times. In 2019, 191,400 thousand tons of poultry meat were produced in Uzbekistan.

In world practice, intensive scientific research is being conducted in the field of poultry, physiology, genetics, veterinary and sanitary and modern science, as automation and automatic machines and other necessary related fields of science and technology, as well as the provision of feed resources, and their safety, the use of natural resources. The main task of the development of poultry farming in Uzbekistan in the near future is the creation of conditions for ensuring high quality and safety of products, taking measures to increase its competitiveness in international markets. In this regard, the purpose of the work was to study the state of poultry meat farming in Uzbekistan and develop priority areas for increasing the economic efficiency of the industry, as well as a set of promising scientifically based measures to ensure the dynamic development of poultry farming. Also, for medium and small entrepreneurs, one of the possible and necessary industries. On the other hand, the possibility of achieving and introducing the science of automation, automata, as well as digitalization for the given layer of entrepreneurs. Modernization has grown into the development of an automated process control system and the introduction of these systems is a necessary and possible one of the ways to solve these problems [2].

The development of production and technologies for the production of poultry meat, scientific research of the world level is intensively developing and taking the results of scientific research at the present time in production there is a certain high efficiency. A further increase in the volume and quality of products, especially in medium and small farms, is the introduction, automation, automated control systems for technological processes in the cultivation of poultry meat. Automate on the basis of digital technologies, microprocessors, microcontrollers, microprograms, all possible automata, as well as the use of the latest advances in computing and digital technology and technology. [3, 4].

Researchers of the world level of agroengineering science and production distinguish that the main areas of research in the future will be automation and robotization of technological process control in poultry meat farming, as well as the development of integrated computer support for a feasibility study of activities, taking into account local conditions [5].

The course of the technological process is characterized by a certain set of physicochemical, biological, economic values - indicators of the technological process. For the correct flow of the technological process on some of the divided conditions, such as (for example):
- Keeping a constant value;
- Retention within the specified limits;
- Change according to a given law.

The set of operations required to start and stop the technological process of poultry meat farming, as well as to maintain or change in the required direction of the values characterizing the technological processes is called control. The set of management operations that relate to the maintenance or change of process indicators is regulation.

The regulation task is part of the management task. Automated control is understood as the automatic phenomenon of a set of actions selected from a set of possible actions based on certain information and aimed at maintaining or improving the functioning of the controlled object in accordance with the control goal.

The state of an object is determined by a number of values that characterize both the impact on the object of the external environment and control devices, and the course of processes inside the object itself.
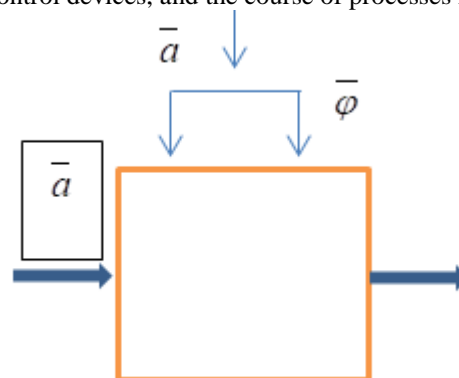
Fig. 1

$\overline{Q}\left\{q_1, q_2, ..., q_k,\right\} \overline{\psi} = \left\{\psi_1, \psi_2, ..., \psi_l\right\}$ where $\overline{u}$ - is the control (regulatory) action.

$\overline{F}\left(\overline{Q}, \overline{\psi}\right)$ - Disturbing influences,

$\overline{Q}$ - Load,

$\overline{\psi}$ - Interference,

$\overline{Z}$ - coordinates (values) characterizing the state of the object,

$\overline{X}$ - controlled (adjustable) coordinates (values).

Some of these quantities are measured in the process of the object's robots, others are not measured and are called uncontrolled. In technological processes, broilers are raised in closed rooms in large batches with extensive use of mechanization and automation of technological processes. The maintenance of the small-day maintenance is used by the equipment KRM-12A and KRM-18A.

With the help of this equipment, feed distribution, drinking water supply, local heating of chickens, lighting of poultry houses are mechanized and partially automated. Temperature, humidity, indoor air, air - gas concentrates are regulated, as well as the veterinarian - the sanitary condition of broilers.

The given controlled values of the parameters of the technological process of cultivation of meat poultry, characterizing the state of the object for which control or regulation is carried out, are called controlled or regulated values [6, 7]. Usually controlled (regulated) values to one degree or another characterize the qualitative indicators of the process in the controlled (regulated) object, which:

- Control (regulation) of feed distribution,
- Drinking water supply control (regulation)
- Control (regulation) of local heating of chickens,
- Control (regulation) lighting of poultry houses,
- Temperature control (regulation),
- Control (regulation) of humidity,
- Room air control (regulation),
- Air control (regulation) - gas concentrates,

Management (regulation) of the veterinary and sanitary state, as well as other influencing parameters in the technological process.

The logical-structural diagram of the automatic control system of the technological process of cultivation of meat poultry is shown in Fig. 2.
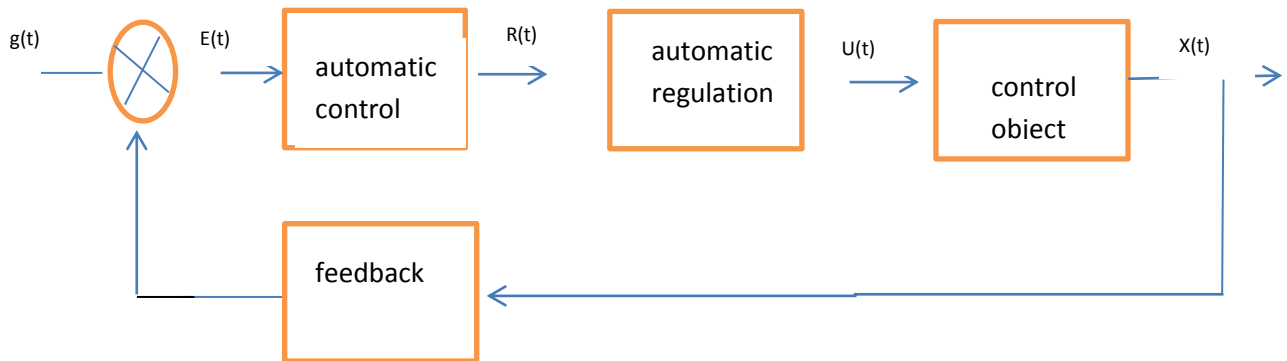
Fig. 2. $\varepsilon(t)$ **- deflection function,** $x(t)$ **controlled value from the setpoint** $g(t)$

$$\tau(t) = F(\varepsilon),$$

$$\varepsilon(t) = g(t) - x(t),$$

The function $F(\varepsilon)$ must be a non-decreasing function $\varepsilon(t)$ and must be of the same sign as ε. In addition ε, time derivatives and integrals ε can also be used as arguments F. Control (regulation) in a function $F(\varepsilon)$ is called deviation control (regulation), in this case the control device is called an automatic regulator. Feedback.

The control (regulation) algorithm shows how the control device should be changed, called an automatic regulator. The feedback provided by the regulator is called the main feedback.

The control (regulation) algorithm shows how the control (regulatory) action $\tau(t)$ should change in order to ensure the specified operation algorithm $x(t)$. The law (algorithm) of control (regulation) is the mathematical dependence of the output coordinate of the regulator $\tau(t)$ on the deviation $\varepsilon(t)$ from its settings, external disturbance $f(t)$, and also the principles of control (regulation).

1. Combined principle of control (regulation)

$$\tau(t) = F\left(\varepsilon, \varepsilon', \varepsilon'', \ldots \varepsilon^m, \ldots \int \varepsilon dt, \ldots, f, f', \ldots, \int f dt, \ldots\right)$$

2. Management (regulation on indignation; $\tau_1(t) = F_1\left(f, f', \ldots, \int f dt, \ldots\right)$

3. Control (regulation) by deviation; $\tau_2(t) = F_2\left(\varepsilon, \varepsilon', \varepsilon'', \ldots, \int \varepsilon dt, ..\right)$

In engineering practice, our typical control algorithms.

1. Proportional - P; $\Pi \ \tau(t) = K_R \varepsilon(t)$;

2. Proportional-integral - PI: $\tau(t) = K_R \varepsilon(t) + \dfrac{K_R}{T_u} \displaystyle\int_0^t \varepsilon(t) dt$;

3. Proportional with the action along the integral and the first derivative - PID. ;

$$\tau(t) = K_R \varepsilon(t) + \frac{K_R}{T_u} \int_0^t \varepsilon(t) dt + K_R T_\partial \frac{d\varepsilon(t)}{dt};$$

4. Integral - I. $\tau(t) = \dfrac{K_R}{T_u} \displaystyle\int_0^t \varepsilon(t) dt$;

5. $\tau(t) = K_R \varepsilon(t) + K_R T_\partial \dfrac{d\varepsilon(t)}{dt}$

Where is the K_R coefficient of proportionality;

T_u - isadrome time (integration time);

T_∂ - the time of the anticipation.

CONCLUSION

The study makes it possible to determine the priority directions for the further development of the poultry industry for small and family entrepreneurs in Uzbekistan. The process control is investigated and the developed algorithm for automatic control of the technical process according to different criteria of controlled parameters is proposed. Sustainable development of meat poultry farming, modernization and automation of the technological process of meat poultry farming is proposed, typical logical block diagrams are proposed, and their values of the impact of the parameters of the technological process of meat poultry farming are determined.

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