Machine milking, farm milk production, milking parlor, biotechnical system, dairy farming.

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EFFECTIVENESS OF MULTIPLE agricultural enterprises

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The above simulation model of agro-ecosystems of growing winter wheat, corn silage and grain, winter oilseed rape, barley, sugar beet and perennial grasses. The model provides meat of pigs, cattle, fish, chicken, milk, eggs, butter, sugar and honey, mushroom cultivation and production of compost. In addition, the proposed model involves the production of biodiesel and bioethanol in the amount required for the operation of mobile equipment, as well as biogas to generate heat and electricity.

ANDhroekosystema, crops, livestock, energy, the energy model, efficiency.

Formulation of the problem. At the present stage of the mankind faced several problems. They include providing on-

population with food (food problem), providing process technology and life energy resources (power problem) and maintenance of biological diversity of life and preserve the environment (environmental problem). Complete these tasks requires overcoming the contradiction, which is that the increase in food production or energy production and consumption leads to disruption of the ecological balance and environmental degradation and vice versa scrupulous compliance with environmental requirements will, at the current level of population growth to food deficit food and energy.

Modern agricultural production partially solve the food problem through effective crop production [1]. Livestock industry, because of the high production costs and low prices, has long been in decline, especially in the production of milk, beef and pork. Production of eggs and poultry in the last few years due to the stable nature of the significant

level of concentration and specialization of production. In addition, the level of agricultural production, energy from own raw materials is low. For example,Ukraine livestock industry, producing significant amounts of organic waste, potentially has considerable resources for biogas production [2, 3, 4], at the same time, the level of biogas production from manure is extremely low.The energy crop potential, based on the use of straw as fuel, according to studies [5, 6, 7, 8, 9] is very significant, but its use in current conditions does not exceed 3%.

Increased use of available energy resources as raw materials of agricultural origin will increase the level of energy autonomy agro-ecosystems, while ensuring that enhance the efficiency of food production and improve the environment.

Analysis of recent research. The main purpose of design is to create a sustainable agro-ecosystems natural and man-made structures [10], which is part of the Earth's biosphere and its development should not degrade under the influence of anthropogenic loads. It is therefore necessary to establish clear morphological structure of natural and man-made agro-ecosystems impact assessment of man-made objects that will monitor changes in agricultural ecosystems, predict its development and to manage her condition [11, 12, 13].

A typical agroecosystem involves growing plants in an appropriate rotation and on this basis to carry out crop production, feed for livestock and poultry, animal products, and energy resources. Energy base agro-ecosystem is the production of heat and electricity from biogas derived from the fermentation of manure, manure and other liquid organic sludge, the use of scientifically based framework nezernovoyi of harvest for heat demand in the form of rolls, bales, broken rice or pellets, briquettes and gas generator produced from straw. Raw materials for the production of liquid fuels - biodiesel and bioethanol are also part of agro-ecosystems. Diversification of agricultural areas is also a serious financial condition for maintaining soil fertility through crop rotation compost production using biological conversion of organic materials [14].

On the basis of the block diagram of the operation [15, 16] algorithms [17] distribution organic resources and modeling [18] humus soil environment developed model of agro-ecosystem based shestypilnoyi rotation of production and energy use of biofuels and recovery of organic matter in the soil. A computer simulation model of agro-ecosystem provides a definition of the resource base for biofuels and further improve energy autonomy of different types of agro-ecosystems.

However, evaluation of technical and economic efficiency of agro-ecosystems with diversified (multi) agricultural production and biofuels requires further clarification.

The purpose of research. On the basis of a computer simulation model of agro-ecosystemswith diversified (multi) agricultural production and biofuels establish key performance operation of such systems.

Research Methodology. Definition of technical and economic efficiency of agro-ecosystemswith diversified (multi) agricultural production and biofuels performed on the basis of simulation computer simulation.

Results. ANDmitatsiyna model of agricultural production (Fig. 1) includes: crop rotation on 300 hectares of arable land from cultivation of major crops such as winter wheat 50 ha corn silage 25 hectares and corn 25 hectares of winter rape 50 ha, barley 50 ha , sugar beets 50 ha and 50 ha of perennial grasses. The model provides meat of pigs, cattle, fish, chicken, milk, eggs, butter, sugar and honey and mushrooms. In addition, the proposed model involves the production of biodiesel and bioethanol in the amount required for the operation of mobile equipment, as well as for further biogas for electricity and heat generation and flaring rolls or broken rice straw to generate heat and electricity.

The analysis involved the operation of the three options agro-ecosystem:of crop production and livestock and biofuels (option 1); of crop production and livestock but without biofuels (option 2); of crop production but without livestock production and biofuels (option 3).

Features getting diversified agricultural production based on the developed simulation model of agro-ecosystem production of biofuels hover in the table. 1 and Table. 2.

1. Features agro-ecosystems (option 1) for the production of agricultural products.

Yields of wheat, kg / ha	Type of production (manufacturing)											
	compost, etc.	wheat, etc.	meat of pigs, etc.	meat cattle, etc.	milk, etc.	poultry, etc.	eggs million. pcs.	fish meat, etc.	mushrooms, etc.	oil, etc.	honey, etc.	sugar, etc.
20	1197	86	13.0	12.7	318	0.7	0.1	9.6	20	0	5	84
25	1481	111	16.2	14.7	397	0.9	0.2	11.9	23	4.3	5	105
30	1764	136	19.5	17.6	476	1.0	0.3	14.3	27	10	5	125
35	2048	161	22.7	20.5	556	1.2	0.4	16.7	30	15.7	5	146

After analyzing the parameters of agro-ecosystems derived from modeling, built graphical humus balance dependency (Fig. 2) depending on the yield of basic crops - winter wheat.

Analysis of schedule, we conclude that the best performance on the balance of humus achieved in agricultural ecosystems without biofuels, but in agricultural ecosystems to the production of biofuels in the yield of grain more than 30 hectares, also achieved a positive balance of humus, and agroecosystem without livestock to achieve a positive balance of humus impossible.

Regarding economic efficiency, the highest profit per hectare achieved in agricultural ecosystems from biofuel production (Fig. 3).

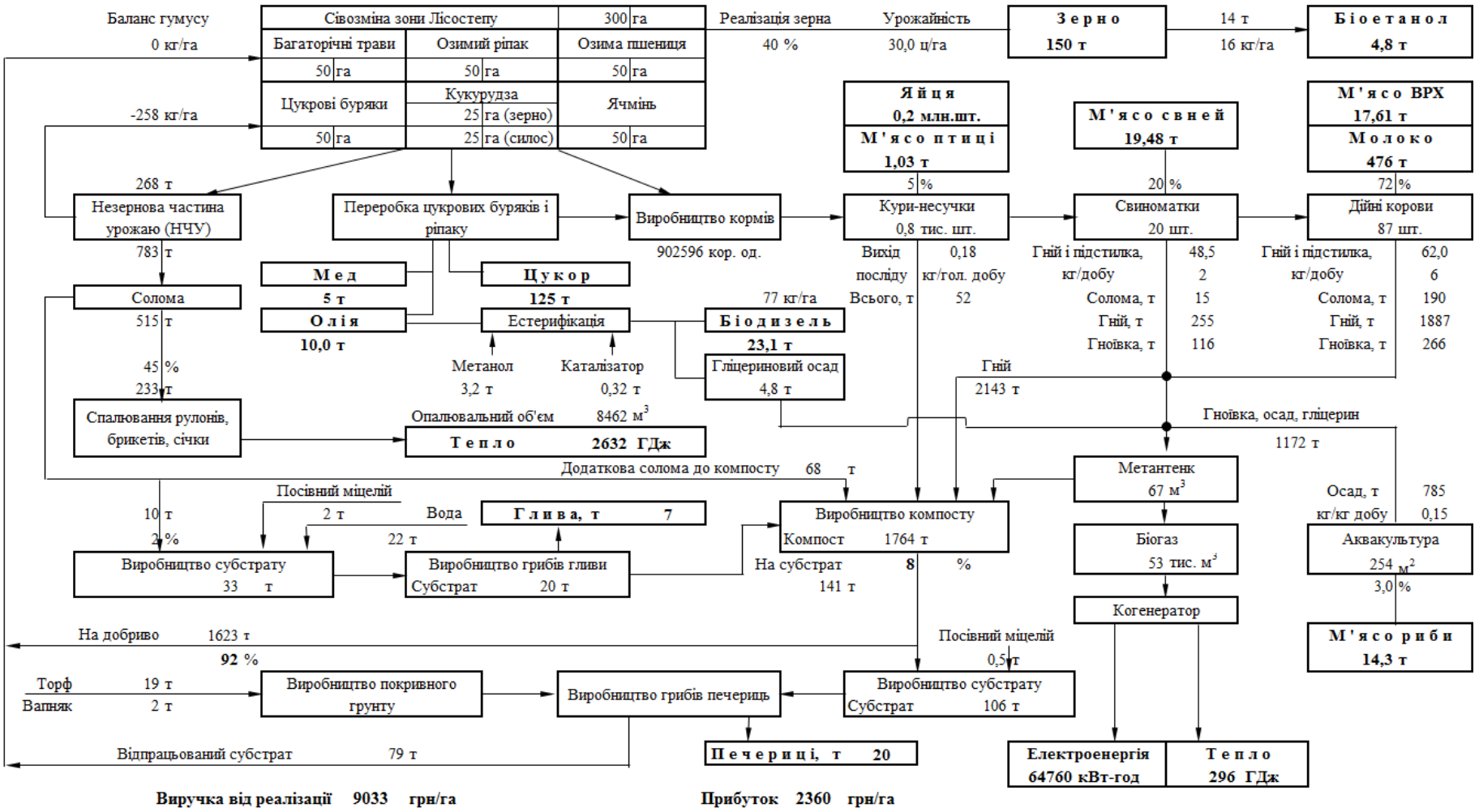

Fig. 1. Scheme of biological energy conversion and organic raw agro-ecosystems to the production of biofuels.

2. Features agro-ecosystems (option 1) for the production of biofuels and its economic performance.

Yields of wheat, kg / ha	Electricity				Heat			Liquid biofuels		The balance of humus, kg / ha	Revenue from product sales, UAH / ha	Profit, UAH / ha
	production, ths. kWh.	taking into account the excess heat ths. kWh.	need, ths. kWh.	level of%	production, GJ	need, GJ	level of%	Diesel biofuels, etc.	ethanol, etc.			
20	44	83	1600	5	1475	1360	109	21.7	4.8	-305	6236	1548
25	54	248	1988	12	2063	1400	147	23.1	4.8	-152	7645	1972
30	65	413	2386	17	2650	1440	184	23.1	4.8	0	9033	2360
35	75	578	2783	21	3238	1480	219	23.1	4.8	152	10421	2747

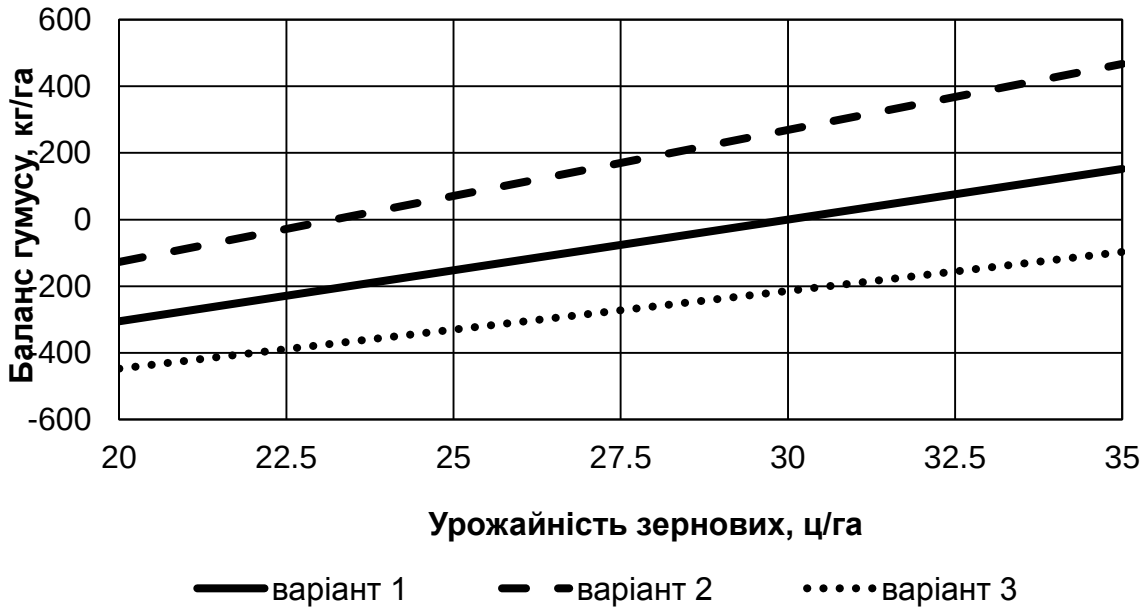

Fig. 2. Dependence balance of humus yield of wheat.

The greatest economic benefit possible to get a balanced agroecosystem that combines crop, livestock and biofuel production, ensuring the non-deficit balance of humus. Since the yield of winter wheat 30 kg / ha income for balanced agro-ecosystem production of biofuels is 2360 UAH / ha, which is higher by 51.6% than the agro-ecosystem without biofuels.

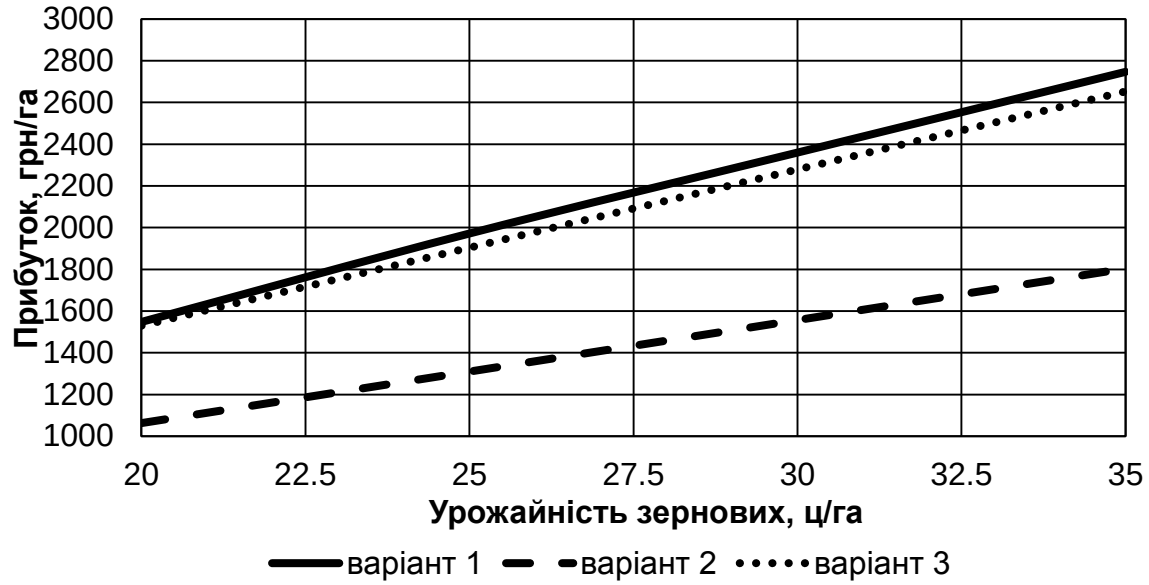

Fig. 3. Dependence of profits from the yield of wheat.

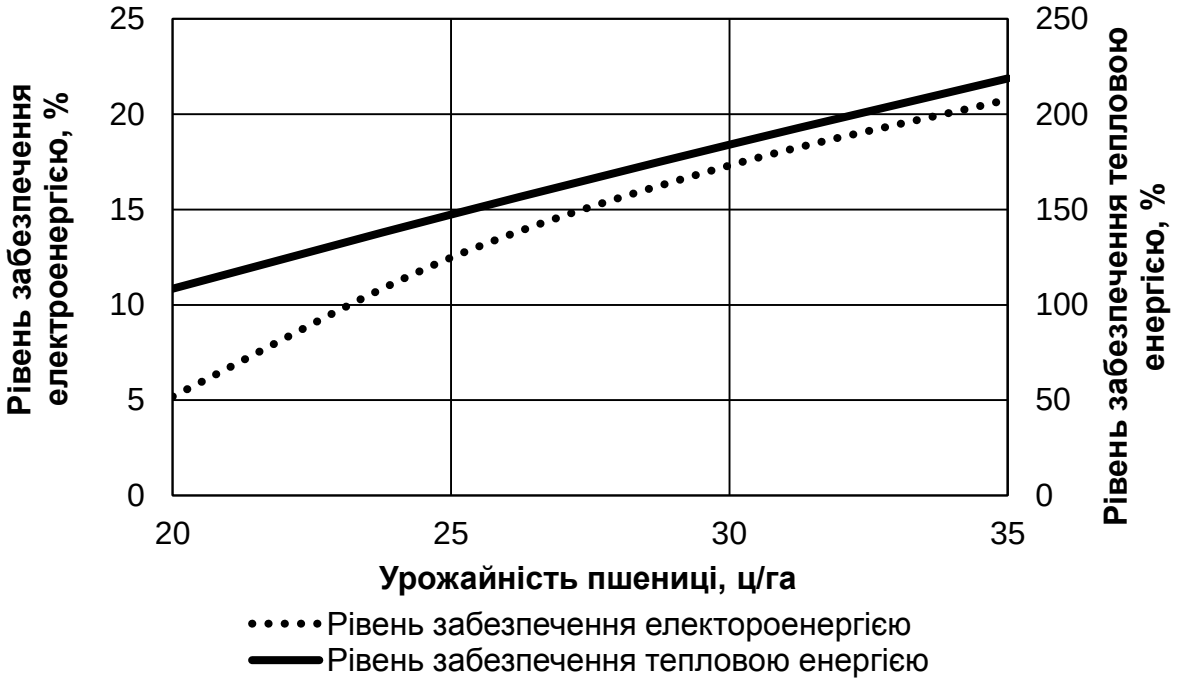

Fig. 4. The level of heat and electricity (without conversion of excess heat into electricity).

The level of electric and thermal energy can be expressed graphically (Fig. 4) and dependencies:

$$RE = 27{,}905 \ln(UP) - 77.951; \quad (1)$$

and

$$THAT = 196{,}59 \ln(UP) - 485.68; \quad (2)$$

Where: PE, TE - level of power and heat respectively%; *UP* - Productivity of basic crops (winter wheat) kg / ha.

With reduced dependency analysis can be concluded that agricultural production can provide their own heat energy needs in the grain yield of 20 kg / ha and above. In larger grain yield excess heat advisable to convert into electrical energy, thus increasing the level of electrical energy.

The structure of financial income in the functioning ahroekosytemy based on simulation model can be represented in a diagram (Fig. 5). The analysis of financial income from the sale of agricultural products and biofuels indicates that one third of all revenues from agro-ecosystem functioning may provide through the production and use of biofuels.

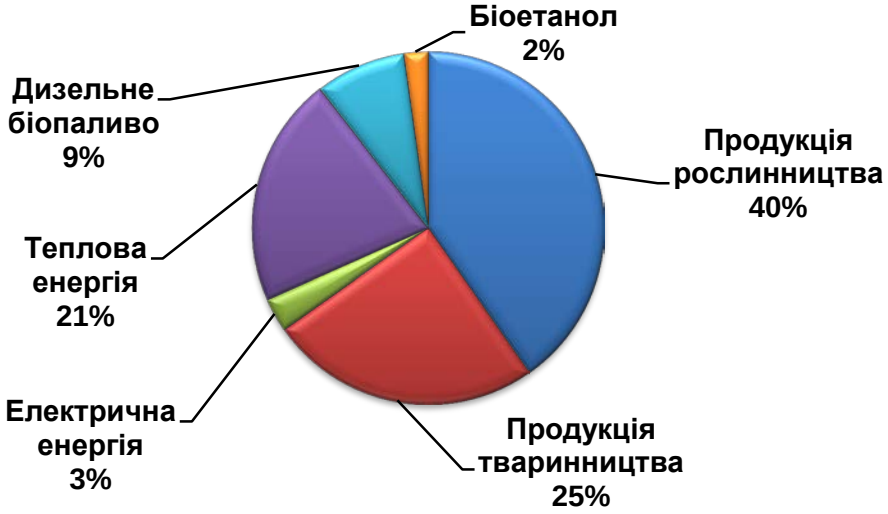

Fig. 5. Structure of agro-ecosystems financial income from agricultural production and biofuels.

Conclusion. Established that the largest economic effects of agricultural ecosystem functioning may get when agroecosystem is balanced and combines crop, livestock and biofuels, ensuring the non-deficit balance of humus. In winter wheat yield of 30 c / ha income from the operation of such agro-ecosystems is 2360 UAH / ha, 51.6% higher than in the absence of the production of biofuels. Due to the production and use of biofuels in terms of agricultural production may provide up to 35% of all financial revenues.

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Present ymytatsyonnaya model of agro-ecosystem functioning with Growing winter wheat, corn silage and grain, winter canola, barley, beet and saharnoy mnoholetnyh herbs. The model provides for production of meat of pigs, cattle, and Pisces ptytsы, milk, yayts, rastitelno oil, Sahara

and Meda, Growing mushrooms and production of compost. In addition, predlahaemaya model predpolahaet byotoplyva production of diesel and bioethanol in Quantity neobhodymom to implement the work mobylnoy technics as well as obtaining biogas for heat and electricity.

Agro-ecosystems, animal husbandry, rastenyevodstvo, byotoplyvo, Energy, model effectiveness.

Simulation model of agricultural productionfunctioning with grown winter wheat, corn silage and grain, winter canola, barley, sugar beets and grasses is shows. The model involves the production of meat of pigs and cows, Fish, milk, eggs, oil, sugar and honey, mushroom cultivation and production of compost. The proposed model involves the production of biodiesel and bioethanol in amount necessary to ensure that mobile equipment and biogas for heat and power.

Agroecosystem, livestock, crop production, biofuels, energy, model, efficiency.

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Methodological principles And LAWS The development of competitive technical and technological SUPPORT FOR LIVESTOCK

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A mathematical model of competitiveness and dynamic patterns of functional and qualitative content of the technical and technological support livestock.

Competitiveness, livestock, manufacturing, technology, engineering, functionality, quality content.

Formulation of the problem. Perspectives of integration of agricultural production country in the world economy are aiming to transform a competitive livestock industry. It is important to choose the optimal strategy and tactics of the technical and technological innovations by constantly improving animal performance and functional quality content technologies.

The basis of technological development should be the creation of a new environment and comfortable conditions for life support, production and reproduction of biological objects.