*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.

This requires increasing resource supply that puts the problem rational use of natural and energy resources, which should be addressed in terms of nature compromises the system and competition in the market of technical and technological solutions. Therefore, the definition of patterns of functional and technical quality content and technological potential of livestock facilities in conjunction with a balanced resursovykorystannyam and its competitiveness is important to improve the industry.

**Analysis of recent research.** The literature study presents the methodology of quality and competitiveness of products [1, 2]. But they can not be fully used for the development of innovative models of production and in assessing the prospects of improvement of technical and technological support of lack of dependency of time. In the information field is a lot of material on areas of mechanization of livestock. Identified [1] The main groups of factors that influence the development of animal husbandry where the main place is given to maintenance. However, competitive factors constant development of technical and technological support livestock, as well as areas of management resursovykorystannya in [1] is not present. It is emphasized the need for innovative development and adaptation of machines to the needs of biological objects [2]. The question most often seen in the "man-machine-animal" but without interdependence with the development of biological and other material resources production. Competitiveness grounded equipment usually on comparative evaluation parameters of products (goods) without regard to its development [3].

Among the most important strategic issues of reforming livestock is to determine promising areas resursovykorystannya management and quality control of manufactured products at all stages of its life cycle. The latter leads to quality management most biological objects of their interactions with each other and with the environment, which is the basis for a competitive livestock and technical-technological products [4].

Lack of methodologies parameter optimization of process equipment for animal facilities was the basis of goal as the creation of research scientific and methodological principles of study parameters of quality technical and technological support of milk by analyzing the energy production cost assessment elements of competitive production in correlation with the level of biosystems enterprises and ensure the competitiveness of engineering and technology for domestic livestock.

**The purpose of research.** Optimization algorithm developed in the "feed - animal - products - manure - organic fertilizer - soil." Defining effective interaction of all elements of the system is the basis for determining the parameters of its components to create favorable

working conditions human, animal welfare and development of plants at a certain stage of development.

**Results.** The development of the experience of advanced European countries is 7-10 years which should address issues of resource management software (consumption) sector dynamic.

Conceptual provisions and criteria of optimization are providing efficiencymaximize the natural features and the genetic potential of biological objects (people, animals, plants, etc.). in conjunction with the functions of the technical and technological support of production within biotechnical systems. Parameter is defined interdependent in terms of their harmonious development together with parameters biotechnical system develops.

Effective methodological principle that allows clearly describe the composition of the elements of production and find their relationship is on the structuring element of competition and competitiveness factors and characteristics. And potential costs of production represented the structural elements of its matrix [1], except where the work tools and work items are presented animals and environmental factors [4]. The terms of the matrix elements reflect the potential production column - Costs of recovery.

Technical and technological competitiveness KTSP software for the consumer, which is the breeding the company determined its quality V / C and MAC prices, which are major factors in achieving competitiveness, cost C for use ratio kTurt materialized energy costs and direct labor per unit of output kTzh, comfort maintenance and reproduction and the possibility of using animal ethology ($\eta_{ET} = \vec{E}_{Gi} E_{Gij}^{-1},$) And the ratio kE cost of providing environment ($\vec{\mathrm{E}}_{Ei}$) And expenses $\vec{\mathrm{E}}_{Ej}$ to eliminate the effects of environmental abuse.

Based on the analysis of livestock Ukraine defined the relationship between Energy costs materialized kTurt technical and technological support and direct human labor costs per unit of output kTzh livestockin energy units by year -kTurt / kTzh = f-AT, where A - A function = f (KC) of technology, T - development time, T = 7-19 years.

When quality assessed as positive impact on the productivity of the equipment, ie V = Evkbpr and C as the cost of use and maintenance of equipment, ie C = $\vec{\mathrm{E}}_{Oi} + \vec{\mathrm{E}}_{Oj}$ And the effect of the technical service as additional products obtained ΔEGW then competitive technology products for the consumer, which is a livestock enterprise can introduce dependence

$$K_{TCII} = e^{-AT} \frac{\Delta E_{GW} k_{бпр}}{Ц_{Tпр} k_{зп}} \frac{\vec{E}_{GO}}{\vec{E}_{OG}} \eta_{кч} k_E \quad (1)$$

Where: ΔEGW - the effects of service of new equipment; kbpr - the level of food safety (kbpr ≤1))[2]; kzp - factor meet the demand for products (the level of market saturation) ηet - the level of use of animal ethology $\eta_{ET} = \vec{E}_{Gi} E_{Gij}^{-1}$ ;kE- the ratio of expenses to ensure Ecology ($\vec{E}_{Ei}$) And expenses $\vec{E}_{Ej}$ to eliminate the effects of environmental abuse; kzp - filling factor market technical products; ηkch- effectiveness of quality (level of efficiency) of new products; kE - the ratio of expenses to ensure Ecology ($\vec{E}_{Ei}$) And expenses $\vec{E}_{Ej}$ to eliminate the effects of environmental abuse; kzp - filling factor market technical products.

For the enterprise developer and manufacturer competitiveness is determined materialized energy Eo contained in the product cost gold reserves to manufacture technical products, sales price and consumer utility MAC R products.

Consumer products usefulness P [2] is the main indicator in determining the competitiveness of products Manufacturer -p = Fk ML, where P - spozhyvcha utility products produced; Fk - functional and high-quality content production; ML - physical quantity of products produced in the consumer.

Then competitiveness of technical equipment for its production can be expressed by the formula:

$$K_{TBP} = \frac{\Delta E_{GW} k_{брп} F_k M_L N_{пр} П_{рТ}}{СЦ_{пр}(З_{вр} + C_c) k_{зп}}, \quad (2)$$

where: Fk - functional and high-quality technical content of products; ML - mass products manufactured new equipment; Npr - the number of sales of technical products; RTA - income producing technical products; C - Costs for consumer use technology products; SS - cost service tech products;RRR - cost production of technical products.

Given that the value of consumer goods established fact of purchase and determined usefulness of products for the consumer, at the time of purchase can write konkurentospromozhnoste equality for the production and the consumer [2].

Equating competitiveness for the consumer and producer and spent sometransformation, given that the cost of livestock production can be expressed as WITH = Turprkpot where TURPROM - materialized energy in animal products, and kpot = (PR + Round Pot) / TURPROM (kpot> 1), where sweat - loss of production, and also taking into account that V = Evkbpr where Ev- useful effect using products determine the functional

dependence of high-quality content products with the requirements of the manufacturer and the consumer:

$$F_k = e^{-AT}\frac{T_{урпр}k_{ПОТ}(З_{вр}+C_c)}{M_L N_{пр} П_{рТ}}\frac{E_{GO}}{E_{OG}}\ \eta_{кч}k_E \qquad (3)$$

where:kpot - coefficient taking into account the loss of productionproducts.

Quality of the enterprise impossible without high-quality staffing production. Therefore, in determining the structure of the company should take into account factors that create the motivation for young workers.

The main value of production for a worker serving a factor meet its needs during their labor is applied, is an indicator of payment, labor conditions and safety (quality and wages), which must satisfy the material and spiritual needs of workers (purchase of modern housing, medical care, parenting and others.). This indicator stands utility rate structures for production workers ηw (the ratio of the production elements for the reproduction of labor power to the entire production capacity Ew / E [2]).In labor motivation also affect development prospects as the quality objectives of the company (E potential, the level of knowledge-intensive industrialization and technology - the ratio of the materialized labor technical and technological support of production and living labor kTurt direct / kTzh.) And career workers [2]. On this basis, the proposed term competitiveness of CWR was working for [2]:

$$K_{врр} = e^{-AT}\frac{E}{\vec{E}_W}\eta_w\eta_{ow}k_{Турр}k_ц k_б, \qquad (4)$$

where: ηW - utility index for production workers; E - production capacity; ηow - standard equipment of workers;kts- the level of potential of enterprise; KB - the level of safety of production;$kTur_p$ - The level of training of the worker; Zrvr - employee costs for production.

To ensure production personnel necessary to make them competitive for the production and use of human labor that should ensure the establishment of maximum materialized labor in production (the ratio TURPROM / LS should strive for maximum value), and the level of training, the worker kTur must meet these requirements. While competitiveness is working to produce:

$$K_{рвр} = \frac{T_{урпр}}{П_i}\eta_{птр}k_{Турр}k_ц k_б. \qquad (5)$$

Based on the coincidence of interests (competitiveness both sides) production and worker determined expression materialized energy production livestock enterprises TURPROM [2]. Framed TURPROM expression in (3) we obtain dependenceequal functional quality content

technical and technological support, taking into account the competitiveness of producers, consumers and workers

$$F_k \geq e^{-2AT} \frac{E\Pi_i}{M_L \vec{E}_W} \frac{E_{GO}}{E_{OG}\eta_{npT}} \frac{\eta_{кч}\eta_w\eta_{ow}}{\eta_{npT}\eta_{ntp}} \mathrm{k}_{\Pi\mathrm{OT}} \mathrm{k}_{\delta} K_{Ц} k_E . \quad (6)$$

Where: ηprT - the rate of return; ηpTr - potential worker.

Based on the above defined pattern functional quality content technical and technological support milk production by the criterion of competitiveness for manufacturers of technical products, its consumers, livestock production for the employee and the employee for this production (Table. 1), which looks like a model - Fk1 = 0, 1548e0,3004T.

The dependence allows to put external requirements for functional and qualitative content Fk technical and technological support. For livestock enterprises is essential that the technical and technological equipment was able to promptly and reliably perform technological functions (η1) in meeting the technological requirements (η2), maximum utility (η3), resource efficiency (min loss) (η4), maximum use of ethology animals (η5) production and ecology (η6). In this case, to quantify the concentration of functional and qualitative filling process possible by the expression: $F_{k2} = \overset{n}{\Pi} \eta_i$.

***1. Functional quality content technical and technological support milk production (by the criterion of competitiveness).***

| Years | Indicators and levels | | | | | | | | | Functional-quality content Fk1 |
|---|---|---|---|---|---|---|---|---|---|---|
| | industrialization, Kturt / KTZ | produk-tyv-ness labor, PI / E | com-fort Twa-ryny, EGO / EO | ozbro-yennosti work E / Ew | potential tials work-nick, ηptr | com-Fort nick work ηow | Eco-lo-gies, kek | sotsi-tial th pro-peche-tion, ηw | loss kpot | |
| 0 | 1.371 | 1.473 | 5.60 | 1.371 | 0.33 | 0,037 | 0.70 | .093 | 1.40 | 0.157 |
| 2 | 1,909 | 1,896 | 4.00 | 1,909 | 0.47 | 0,042 | 0.75 | .112 | 1.34 | .277 |
| 4 | 2.658 | 2.528 | 3.00 | 2.658 | 0.70 | .049 | 0.81 | .134 | 1.26 | .513 |
| 6 | 3.702 | 3.467 | 2.10 | 3.702 | 1.00 | 0,056 | 0.87 | .162 | 1.19 | .931 |
| 8 | 5.154 | 4.494 | 1.60 | 5.154 | 1.43 | .064 | 0.93 | .197 | 1.12 | 1,758 |
| 10 | 7.175 | 6.067 | 1.10 | 7.175 | 2.00 | 0,073 | 0.98 | 0,238 | 1.05 | 3.089 |

Expressing timeliness and reliability of the process, as the ratio of used product $\Pi_i^{akt}$ for all its production volume AI [1]: $\eta_1 = \Pi_i^{akt}\Pi_i^{-1}\eta_{над}$, Meet the technological requirements, $\eta_2 = \Pi_i^{mp}\Pi_i^{-1}$ utility - the ratio of the resulting product in addition to the execution of the process (operation) to the cost of its implementation, expressed in the same terms $\eta_3 = \Delta\Pi^{\tau}_{(\Phi_i)}\Delta З_i^{-1}$ Losses in

the production - equivalent content as the ratio obtained product Pee all costs of its production materials, expressed in the same terms $\eta_4 = (1 - k_{npt})$ The level of use of animal ethology - $\eta_5 = \vec{E}_{Gi} E_{Gij}^{-1}$, and ensuring environmental production - $\eta_6 = \vec{E}_{Ei} E_{Ej}^{-1}$, get the measure functional and qualitative filling processes of livestock production. [4]

To quantify the functional and qualitative filling processes of livestock production is necessary to analyze and identify changes depending on the components within 10 years in correlation with the performance of cows that varies from 3800 to 7000 kg of milk per year.

Of the six indicators of two - resursovykorystannya η4 efficiency and environmental indicator η6 - taken under external demands performance loss (η4 = 1 / kpot) and ecology (η6 = kek). Efficient use of resources (0.71 ... 0.95) is determined by depending η4 = = 0,7088e0,0291T and ecology - η4 = kek = 0,7029e0,0343T. Indicators of impairment process execution η3 ethology and animal η5 justified based on the requirements of productivity of animals. Usefulness implementation process or improve the quality of its performance is evaluated additionally received products, per unit cost of this process or improve its quality. Unit costs for animal production are reduced with increased productivity of animals, primarily due to more efficient use of feed, stimulated by increasing the comfort of the content, including by animal ethology. This is the foundation to the first stage of development, believing that the utility rate ranges 1.0 ... 1.6 depending accordance η3 = 1,0017e0,0475T.

The behavioral features of animals (ethology) in modern technologies of production of animal products used in the feeding, watering, partly to ensure hygiene. According to our research, the ratio of cost of reproduction of animals, without forage costs, the costs of the animal, excluding the cost of production animals to humans, approaching 0.5. Thus, this factor is used by half of the existing capacity.

Potential ethology of animals should be widely used (98%) due to a decrease in 5 times the cost of the animal in the interaction with the equipment, the level of which is 5.62% of the total cost farm equipment and increased costs for the animal for animal participation in the process of ensuring the microclimate livestock buildings, prevention and treatment of limb, optimize feeding when choosing a diet and reproduction. So assume that this figure varies by 0.5 ... 0.98 depending η5 = 0,5025e0,0604T.

If exponential equation is represented in the form $y_T = A_i e^{k_i T}$

$$F_k = \left(\prod A\right)_i e^{T \sum k_i} . \quad (7)$$

On the basis of (7) for a given Fk1 (Table. 1) at the time determined by two main parameters of the process - timely implementation and indicator processes η4 meet technological requirements η6.

Introducing the timeliness of processes as dependent on the performance index of performance of a process, and given that animal performance is increased almost two times, one can assume that the rate of timely execution of processes varies in the range of 0.9 ... 2.2 depending accordance η1 = = 0,868e0,0916T. According to our calculations technological requirements are met by 72%. Satisfaction level of requirements should be increased to 98% and can be assumed by depending η2 = 0,7287e0,0309T.

Synthesizing the above, depending in Table. 2 gain values functional and qualitative content of the technical and technological support milk production (by the criterion of productivity of animals and costs) over time as domestic demand competitiveness of technical equipment and production technology.

***2. Functional and qualitative content of the technical and technological support milk production (by the criterion of productivity of animals and costs).***

| Years | Indicators and levels | | | | | | functional nalno-his platform quality-ment, Fk2 |
|---|---|---|---|---|---|---|---|
| | timely ness, η1 | Zak-volennya requirements, η2 | useful ness, η3 | effective ness resource use Tunney, η4 | ethology animals η5 | Environment produc-tion, η6 | |
| 0 | 0.9 | 0.72 | 1 | 0.71 | 0.5 | 0.7 | .162 |
| 2 | 0.98 | 0.78 | 1.1 | 0.75 | 0.57 | 0.75 | .274 |
| 4 | 1.2 | 0.83 | 1.21 | 0.79 | 0.64 | 0.81 | .516 |
| 6 | 1.4 | 0.88 | 1.34 | 0.84 | .725 | 0.87 | .941 |
| 8 | 1.7 | 0.94 | 1.47 | 0.89 | 0.81 | 0.93 | 1.673 |
| 10 | 2.2 | 0.98 | 1.60 | 0.95 | 0.92 | 0.98 | 2.962 |

The dependence functional and qualitative content Fk2 = 0,1586e0,2937T technical and technological support milk production, as domestic demand production allows to set the parameters of the requirements for technical and technological support milk production.

The proposed methodology for optimizing the structure parameters and operation quality processes livestock production can be used for decision making strategic management industry.

**Conclusion.** The proposed methodology for optimizing the structure parameters and operation quality processes livestock

production can be used for decision making strategic management industry. At the same time it allows to determine the structure and parameters of technological processes, technology components of milk. The dependence (12), in determining the value Fk1 the expression (7), allows to set requirements for quality performance and parameters of technological processes of competitive livestock production.

## References

1. VV Shatskyy Modeling processes mehanyzyrovannыh pryhotovlenyya Stern / VV Shatskyy. - Zaporozhe: PC "X-PRESS", 1998. - 140 p.
2. *Shatskyy V.* Methodology optimization parameters konkurentosposobnoho techno and technological Provision animal husbandry / VV Shatskyy, AG Skryar, DA // MylkoLabor Tauride Agrotechnological State University. - Melitopol: Tavricheskiy State Agrotechnology University, 2010. - Vol. 10, v. 5. - P. 119-128.
3. Method of complex evaluation of competitive technology for livestock. 46.16.19-2003 gain / VF Sychkar / MAP, 2007.-22 pp.
4. VV Shatsky Theoretical and methodological basis of the analysis of functional and yakistnoho napovlennya technical and technological support pig / VV Shatsky, SM Kolomoets // Journal of Kharkov National Technical University of Agriculture. Petro Vasilenko. - H. 2013 - Vol. 132 "Technical systems and livestock technology." - S. 130-138.

*Predstavlenы matematycheskye model zakonomernosty Dynamic competitiveness and development of functional-kachestvennoho napolnenyya techno and technological Provision animal husbandry.*

***Competitiveness, animal husbandry, Production, Technology, technics, funktsyonalnoe-kachestvennoe napolnenye.***

*Mathematical models of competitiveness and conformity to law of dynamic development of functionally-high-quality filling of technic and technology providing of stock-raising are presented.*

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

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## COST POWER TO DRIVE FEED HVYNTAHRANULYATORA

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