

**ANALYSIS OF REPRODUCTION FEATURES OF MATERIAL AND TECHNICAL
BASE OF AGRICULTURAL ENTERPRISES**

Kachan Dmytro,

PhD student,

Department of Finance, banking and insurance

Bila Tserkva National Agrarian University, Ukraine

e-mail: dmqachan@gmail.com

Kachan Lesia,

PhD in Agriculture, associate Professor,

Department of Technology in Plant Production and Plant Protection

Bila Tserkva National Agrarian University, Ukraine

e-mail.: kaspruk70@ukr.net

Abstract. *In this article we highlighted external and internal reproduction factors of MTB, considered the dynamics of components of material and technical base of agricultural enterprises. We analyzed the dynamics of indicators of reproduction of fixed assets of agricultural enterprises, and also analyzed the impact of level of technical support of agricultural enterprises on load of 1 tractor and combine harvester. The dynamics of availability of tractors depending on area of land use was drawn up. An analysis of the dynamics of size and structure of tractor park of agricultural enterprises was conducted.*

Keywords: *agrarian enterprises, machinery, material and technical base, reproduction.*

JEL Classification: Q12, Q13

UDC: 631.11(477)

Material and technical base (MTB) of agricultural enterprises as a set of necessary elements allows to carry out a continuous production cycle with minimal expenses of labor. A process of MTB reproduction for agricultural producers is determined by a number of internal and external factors, among which are the following: a possibility of investment resources from external and internal sources of funding, an efficacy of state support, organization of production activities, which focused on resource conservation, size and specialization of the enterprise, a stability of financial state, efficiency of production activity, product competitiveness, investment activity, technical efficiency of the machinery, its physical and functional wear and perception for innovation [1].

A structure of material and technical base of agricultural commodity producers includes all necessary means of production, which at the same time are subjected to reproduction processes, which cause qualitative improvement. A composition of means of production of agricultural commodity producers is characterized by actual availability of fixed and current assets, including buildings, structures, equipment, as well as seeds, fuel, spare parts, plant protection products, fertilizers, which provides continuous production of agricultural products.

The means of production involved in economic turnover should be updated regularly to ensure a continuous creation of social product. Reproductive processes in material and technical basis of agriculture can be carried out through a purchase of new additional productive resources and a creation of their insurance reserves at enterprises. Reproduction of certain types of means of production is carried out by agricultural enterprises on their own. Machinery and equipment, fuel and lubricants, fertilizers and other means of production should be purchased only from suppliers, specializing in their manufacture [2]. In the presence of appropriate technological conditions on farms, seeds, organic fertilizers, and certain types of spare parts are reproduced, as a rule, without the participation of outside organizations.

The necessary condition for the restoration of material and technical resources of agricultural enterprises is an investment of funds in projects of reconstruction and construction of industrial premises, repair and restoration of equipment, procurement of raw materials. Note that reproduction

processes in development of the material and technical base of agriculture is characterized by clear periodicity due to the impact of seasonal production in crop and livestock sectors.

In order to find out features of the reproduction process, consider the structure of the material and technical base in agricultural enterprises, which in value terms is reflected in Form 1 "Statement of financial condition" (*Table 1*).

Table 1: Dynamics of components of the material and technical base of agricultural enterprises

Indexes	Year					2016 in% to	
	2012	2013	2014	2015	2016	2012	2015
Fixed assets	73471.0	81768.5	85534.4	103733,8	143380,8	195.2	138.2
% to all	48.3	48.9	45.5	43.3	43.7		
Long term biological assets	6659.7	7679.4	7098.2	8091.3	8955.0	134.5	110.7
% to all	4.4	4.6	3.8	3.4	2.7		
Current biological assets	12088,8	11793.8	11892.0	14047.6	16740.7	138.5	119.2
% to all	8.0	7.1	6.3	5.9	5.1		
Stocks	59,753.4	65955.5	83650,8	113907.0	158935.9	265.9	139.5
% to all	39.3	39.4	44.5	47.5	48.5		
Total	151972.9	167197,2	188175.4	239779,7	328012.4	215.8	136.8

Source: compiled according to the State Statistics Service of Ukraine.

Data in *Table 1* convinces that during investigated period there is a significant increase in cost of components of material and technical base of enterprises of corporate sector of agrarian economy. This circumstance is due to both increase in cost of incoming material resources, as well as their quantity, especially inventories. In structure of material and technical base, the largest share is occupied by fixed assets and stocks. It should be noted that during investigated period there is a decrease in proportion of MTB structure. This circumstance is caused by several reasons. First, long-term biological assets were allocated on a basis of regulatory-legal acts from fixed assets. Second, most households of corporate sector of agricultural economy in process of production modernization prefer to use as temporary grain storage facilities not designed to this needs. Thirdly, most agricultural enterprises do not revalue fixed assets. It should be noted that a revaluation of basic assets is a matter of purely voluntary nature. It is this conclusion that follows from clause 16 P (C) BO7: "An entity may revalue an item of property, plant and equipment if the residual value of that object is significantly different from its fair value at a balance sheet date" [3]. According to recommendations of the Ministry of Finance, the criterion of materiality may be set at a rate equal to 1 percent of net profit (loss) of the enterprise (p. 34 Methodological Recommendations No. 6161, pp. 2.20.1 of Methodical recommendations № 635) [4, 5] or in an amount equal to a 10 percent depreciation of the residual value of property, plant and equipment from their fair value (paragraph 34 of Methodological Recommendation No. 561). However, these recommendations are not binding, and company has a right to disregard them and independently establish the criterion of materiality. Fourth, there is a process of modernization of material and technical base of business entities in a field of agribusiness, especially large ones, which are the leading producers of certain types of agricultural production, especially energy-intensive ones.

According to calculations by scientists of the Institute of Agrarian Economics, increase in cost of basic agricultural products is largely due to their revaluation (9%) and inflationary factors (43.3%). During this period, prices for tractors, agricultural machinery and motor vehicles grew by 1.4 times, for construction and installation work by 1.2 times, for construction materials by 1.3 times [6].

It should be noted that there is a slight increase in value of long-term biological assets. This circumstance is caused by a renewal of main herd of farm animals, mainly due to their acquisition.

Growth in stock prices is also caused by two main factors. First, an increase in cost of fuel, seed, as well as plant and animal protection and mineral fertilizers. Second, as evidenced by the results

of observations on the activities of farms in corporate sector of agrarian economy, most of them, especially those who belong to middle and large categories, try to provide themselves with main types of production stocks in accordance with technological norms.

It should be noted that fixed assets are the basis of material and technical base, which combine active and passive parts of means of labor. It is established that now there is a gradual increase in indicators characterizing reproduction of fixed assets of agricultural enterprises (*Table 2*).

Table 2: Dynamics of indicators of reproduction of fixed assets of agricultural enterprises

Indexes	Year					2016 to	
	2012	2013	2014	2015	2016	2012	2015
Update factor, incl.	19.9	16.2	15.7	19.2	23.3	3.4	4.1
purchased in% to revenue	56.1	60.7	55.3	51.5	50.2	-5.9	-1.3
Fixed assets retirement factor	8.5	6.1	7.0	5.8	19.1	10.6	13.3
Written due to wear in% to availability	12.2	15.7	12.9	11.8	11.5	-0.7	-0.3
Wear factor	7.5	7.1	6.8	6.7	6.5	-1, 0	-0.2

Source: compiled according to the State Statistics Service of Ukraine.

On guided calculations in *Table 2* it is shown that during 2012-2016 a coefficient of reproduction is exceeding a coefficient of disposal and significant growth is observed during 2012-2015. This fact demonstrates an implementation of investment funds in agricultural production in corporate sector of agrarian economy. It should be noted that more than a half of fixed assets would come through their acquisition, rest through other sources of investments, in particular by adding fixed assets to share capital.

It has been established that during the investigated period a disposal of fixed assets is gradually decreasing because of wear, which can be explained in two ways. Firstly, most agricultural enterprises, mainly medium and large, completed the modernization of fixed assets. Secondly, agribusiness entities can continue to use fixed assets that are fully depreciated. In accordance with Item 33 of the P (C) BO 7 "Fixed Assets" an object is written off from balance due to a free transfer or non-compliance with the criteria for recognizing an asset [7]. The same norm is contained in clause 40 of Methodological recommendations on the accounting of fixed assets, approved by the order of MFU dated September 30, 2003, No.561: the object of fixed assets ceases to be recognized as an asset (written off from the balance sheet) in case of its retirement due to sale, liquidation, free transfer, final deterioration or other reasons for non-compliance with the criteria for recognizing the asset.

An important part of fixed assets is an active part, represented by vehicles, machinery and equipment. The processes of reforming enterprises of the agrarian economy caused and to a certain extent is a manifestation of crisis phenomena in formation of material and technical base, led to a decrease in the amount of agricultural machinery, transport vehicles and equipment (*Table 3*).

During analyzed period, the greatest rates of reduction in numbers were allowed for tractor trailers, potato planters and cattle feeders. In our opinion, a reduction of the last two types of technical equipment is due to a significant reduction in the volume of potato and livestock production in most of state-owned enterprises.

At the same time, a significant reduction in number is observed for technical means: tractors and combine harvesters. We share the opinion of scientists who say that this situation leads to significant losses in agricultural production by reducing opportunities for timely implementation of agro technological operations. However, in order to objectively assess such a situation, it is necessary to take into account the technical capacities of the machinery and its productivity.

It has been established that a reduction of tractors and combines fleet has also taken place in other countries. Thus, the US park of combine harvesters during 2000-2015 declined from 607 thousand units to 349 thousand units, or in 1,7 times; tractors from 4609 thousand units to 4390 thousand units, or 1,05 times. In Canada, a tractors fleet in 2000 was 728 thousand units, in 2015 - 733 thousand unit, so it practically remained at the same level; The park of combine harvesters has

decreased from 158 thousand units up to 103 thousand units, or in 1,5 times. In Germany, the park of tractors in 2000 was 1374 thousand units, and in 2015 decreased to 798 thousand units, grain harvesters 155 thousand units and 84 thousand units in accordance [8].

Table 3: Dynamics of number of certain types of technical equipment and transport of agricultural enterprises

Indexes	Year					2016 in % to	
	2000	2010	2014	2015	2016	2012	2015
Tractors all brands	318927	168532	130811	127852	132686	41.6	103.8
Tractor units trailers	207766	84968	52176	49004	48547	23.4	99.1
Seeders all types	131972	77807	65596	65492	67157	50.9	102.5
Potato cutters	7116	2664	1689	1631	1573	22.1	96.4
Sprinkler machines and installations without irrigation	12991	4145	3723	3815	4103	31.6	107.5
Mowers tractor	18878	9983	8014	7892	8228	43.6	104.3
Headers roller	34768	16332	13485	13595	14477	41.6	106.5
Combines grain harvesting	65240	36783	27196	26735	27366	41.9	102.4
Milking installations and aggregates	33498	10547	10476	10232	10305	30.8	100.7
Feeders:							
• for livestock	15755	5219	3561	3484	3465	22.0	99.5
• for pigs	2960	1043	3364	3452	3140	106.1	91.0

Source: compiled according to the State Statistics Service of Ukraine.

We will analyze an impact of level of technical support of agricultural enterprises on a load per tractor and combine harvester (*Figure 1*).

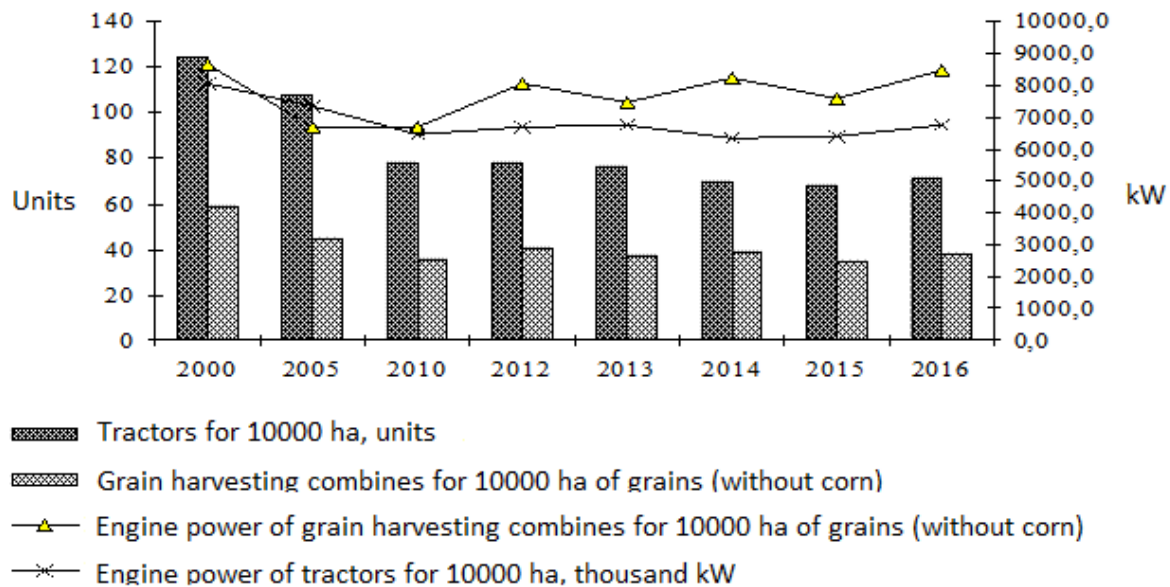


Figure 1. Dynamics of a number of tractors per 1000 hectares of arable land and grain harvesters per 1000 hectares of grain (without corn)

Source: compiled according to the State Statistics Service of Ukraine.

Data presented on Figure 1 shows that during 2000-2016 number of agricultural enterprises per 1000 hectares of arable land decreased by 44%, grain harvesters by 35% per 1000 hectares of

grain. At the same time, a power of tractor engines per 1000 hectares of corresponding type of agricultural land decreased by only 16%, and grain harvesters by 2%. Consequently, with a significant decrease in number of technical means there is a lag in decline in power of technology, which allows us to conclude that it was replaced with more powerful models.

Today among environment scientists acquires a popularity comparison of indicators of loaded arable land per one tractor or sown grains for 1 grain-harvesting combine. If one tractor load average in Ukraine is 14 hectares, in the US 38 hectares, in France 14 hectares, while in Germany 12 hectares. The load on one grain harvester in Ukraine is 26 hectares, in USA it is 63 hectares, in France 53 hectares, the United Kingdom 80 hectares [9]. However, we share the opinion of scientists that the indicators for a level of supply of tractors and combine harvesters of agricultural enterprises in Ukraine and foreign countries for many reasons are not comparable. Currently, in most farms of corporate sector of agrarian economy there is a process of optimization of technical means, due to use of innovative agricultural production technology.

An important factor in assessing of technical support of agricultural machinery is its availability in agricultural enterprises, depending on the level of land use (*Table 4*).

Table 4: Dynamics of presence of tractors in agricultural enterprises, depending on area of land use (per 1 farm)

	Year			2016 in % to	
	2014	2015	2016	2014	2015
Enterprises that had agricultural land	7	10	7	100.0	70.0
incl. area , ha					
to 50.0	2	4	2	100.0	50.0
50.1-100.0	2	5	2	100.0	40.0
100.1-500.0	4	6	4	100.0	66.7
500,1-1000,0	7	7	7	100.0	100.0
1000,1-2000,0	11	11	11	100.0	100.0
2000,1-3000,0	16	16	16	100.0	100.0
3000,1-4000,0	20	20	20	100.0	100.0
4000,1-5000,0	24	24	24	100.0	100.0
5000,1-7,000,0	28	27	28	100.0	103.7
7000,1-10000,0	35	35	34	97.1	97.1
more than 10000,0	70	74	78	111.4	105.4
Enterprises that did not have agricultural land	7	9	9	128.6	100.0

Source: compiled according to the State Statistics Service of Ukraine.

It should be noted that during the investigated period there was a process of optimization of the number of tractors on farms of corporate sector of agrarian economy, depending on the area of land use. Thus, in agricultural enterprises with an area of land use 500,1-5,000 hectares, during three years, no significant changes in the number of tractors were observed. However, small agribusinesses in 2016 against 2015 saw a decrease in the number of tractor park. This circumstance is caused by a decision of management of agricultural enterprises to focus on ensuring implementation of mechanized works only in their own economy. The provision of services by farmers to private farms by this category of agricultural producers is minimized due to existence of tax barriers and increased saturation by means of small-scale mechanization of rural households.

The growth of size of agricultural enterprises land banks leads to increase in the number of energy-intensive tractors with a power output of 100 kW or more (*Table 5*). According to the results of the study, energy-intensive tractors are concentrated in agricultural enterprises with an area of land use of more than 7,000 hectares and a purpose for mechanization of production processes in crop production.

The largest share in the structure of the tractor park of enterprises of corporate sector is occupied by tractors with an engine power of 60 to 100 kW, which are represented mainly by production of the Minsk tractor plant. They are used in all agricultural enterprises, regardless of the area of land use. A positive tendency of increasing their quantity should be noted.

Gradually there is a reduction of low-power tractors with an engine power of up to 60 kW. This circumstance is caused by absence of positive trends in development of horticulture and gardening of agricultural enterprises, as well as reduction of the number of small farms of corporate sector of agrarian economy where they were the most common means of mechanization of production processes.

Table 5: The dynamics of the number and structure of the tractor park of agricultural enterprises

Indexes	2010		2013		2016		2016 in % to	
	unit	in % of total	unit	in % of total	unit	in % to of all	2010	2013
Tractors - all	151287	100	146004	100	132686	100	87.7	90.9
incl. power tractors								
less than 40 kW	9798	6.5	8587	5.9	6817	5.1	69.6	79.4
from 40 to 60 kW	57584	38.1	50746	34.8	41303	31.1	71.7	81.4
from 60 to 100 kW	43929	29.0	45420	31.1	44250	33.3	100.7	97.4
100 kW or more	39976	26.4	41251	28.3	40316	30.4	100.9	97.7
of the total number of tractors								
tractor wheel	133851	88.5	132714	90.9	123439	93.0	92.2	93.0
crawler tractors	17436	11.5	13290	9.1	9247	7.0	53.0	69.6

Source: compiled according to the State Statistics Service of Ukraine.

As the data shows, the agricultural enterprises are gradually reorienting to wheeled tractors, which, by their purpose, are universal, which makes it possible to carry out a wide range of works on production of agricultural products.

Consequently, during 2010-2016, majority of agricultural enterprises has completed a formation of technical base. Currently, movement of technical means is happening under the influence of introduced technologies of agricultural production. Evidence of this is relatively low indicators of release of the main types of agricultural machinery, coefficient of retirement in the main types of agricultural machinery tends to decrease. In addition, relatively low percentage of write-offs of technical equipment at the enterprises of corporate sector is an evidence of established technical base of most agricultural enterprises.

Favorable weather conditions provided farmers with high yields, and devaluation of hryvnia in 2014-2016 made a positive impact on income of agrarian enterprises even in dollar terms. Accordingly, demand for equipment was supposed to be at the level of 2012-2013. However, it was much smaller, resulting in delayed demand, which agricultural producers actively implemented in 2016, restoring a market of agricultural machinery by 70% compared with 2013, and above all an important role here played a stabilization of hryvnia exchange rate.

Despite increased prices of foreign machinery because of devaluation in 2.6 times, agricultural enterprises in 2016 purchased grain harvesters and tractors worth almost 5.5 billion UAH. This amount exceeds are similar index of 2013 in 4 times. An increase in annual amount of purchased equipment took place at the expense of 70% increase in number of purchased machinery and a 2.6 times increase in prices.

Specify that in 2016 among 902 purchased by agricultural enterprises combine harvesters most of the machines were John Deere (211) and Claas (95). Among the purchased 1557 tractors with a power output of more than 100 kW 404 John Deere machines, 220 New Holland and Belarus, 205 Case.

In domestic specimens of indicated machinery occupy a small part on the market, but recent initiatives of Ministry of Agrarian Production with a 20% compensation of cost of domestic production machinery should correct this situation and Ukrainian machinery will gradually occupy decent positions in a highly competitive agricultural machinery market.

Promising direction of reproduction of technical means is a development of secondary market of agricultural machinery. During 2012-2016 agricultural enterprises purchased about 10% of used agricultural machinery. So, in economically developed countries (USA, Germany, etc.) there is a

system of sale of used machinery on secondary markets, on which old tractors are sold on average 3 times more than new ones. Lifetime of most old tractors is 4-5 years, combines 3-4 years. It is known, that this technology is implemented through a dealer system after good repair and maintenance, its cost 30% of the initial [10]. In Ukraine, sale of used equipment is currently poorly developed, and even in study of the reproductive process, this problem is not getting enough attention. However, it should be noted that this is one of the promising options for financially weak or small businesses. Outlined directions of the reproduction process require considerable refinement and search for factors that determine possibilities for their application by identifying disadvantages and essential features of each option of formation and rational use of basic productive assets in agriculture.

We suggest that an important factor of technical re-equipment should be the state program "Actual compensation of the cost of agricultural machinery and equipment of domestic production". According to project of the State Budget for 2018 for partial compensation of purchase of domestic agricultural machinery and equipment it is proposed to allocate 950 million UAH. Next year's maintenance of the program "Financial support for agricultural producers " in the direction "Partial compensation of the cost of agricultural machinery and equipment of domestic production" is an extremely important step to stimulate domestic agro-mechanical construction and creation of conditions for activation of renewal of machine-tractor parks of agricultural enterprises.

According to paragraph 8 of the Resolution of the Cabinet of Ministers of Ukraine dated 01.03.2017 № 130 "On Approval of the Procedure for Using the Funds Provided in the State Budget for Partial Compensation for the Cost of Agricultural Machinery and Equipment of Domestic Production" in the list of domestic machinery and equipment for the agrarian sector which value is partly compensated by the state budget, stated: name and code of manufacturer and its subsidiaries (separate units) with its own code and his dealer; type and brand of machinery and equipment; reference price of equipment. We believe that low effectiveness of the program of compensation of the cost of agricultural machinery is primarily caused by bureaucratic aspects of the process filing of application, submission of information to fill the forms, opening of additional accounts with state banks, etc.

However, negative impact was caused in 2017 by extension of application deadline for inclusion of their products to the list of domestic machinery and equipment for agriculture, cost of which is partially compensated by the state budget to 1st of May. Indeed, by this time agrarian enterprises have not only carried out most of the spring field work, which could be purchased agricultural machinery for within a framework of the state program, but also partially already decided on its acquisition in the autumn period.

In addition, according to the Ministry of Finance's budget note, first payment of compensation took place only in the fourth quarter (October), while purchase of equipment is carried out throughout the year. Consequently, delay in obtaining compensation reduces attractiveness of the state support program.

But the most important factor that led to a failure of implementation of the state program "Financial support for agricultural producers " in the direction "Partial compensation of the cost of agricultural machinery and equipment of domestic production", is a lack of quality and efficiency of domestic machinery in comparison with foreign analogues, demotivating potential applicants to participate in this program.

However, we believe, that the mechanism of agricultural program of cheapening of domestic machinery production should be improved in order to increase its effectiveness. During nine months of 2017 and with a budget envisaged by the state budget of UAH 550 million, only 2.3% 11.58 million UAH were used for the program. According to the Ministry of Agrarian Policy and Food of Ukraine, 96 agricultural enterprises had to be compensated for such amount for the purchase of 149 units of Ukrainian agricultural machinery.

Conclusions

It is proved that during the investigated period there is a significant increase in cost of incoming material resources, and in the structure of the material and technical base the largest share is occupied by fixed assets and reserves. It should be noted that there is a partial reduction in the share of

major stocks in the structure of MTB, due to an exclusion of long term biological assets from fixed assets based on regulatory and legal acts; most of the farms in a process of modernization of storage facilities prefer temporarily facilities; and they do not carry out revaluation of fixed assets.

Excess of refresh rate in comparison with indicator of outflow rate during 2015-2016 is revealed, which ensures a growth of number of important element of the material and technical base of agricultural enterprises technical means. In order to ensure a normal reproduction of the machine-tractor park it is justified, that it is needed to update 8-12% annually. So, in 2016, only value of index of renovation of machines for sowing and planting, sprinkling and for the protection of crops, as well as combine harvesters, corresponds to normative meaning.

REFERENCES:

1. Chaplinsky V.R. Material and technical base in agriculture of Khmelnytsky region / V.R. Chaplinsky // Collection of scientific works of the Tavria State Agrotechnological University (economic sciences). - 2013. - No. 2 (4). - P. 322-328.
2. Naumenko O. A. Material and technical base and production of livestock products in farms / O. A. Naumenko, E. Z. Petrusa, S. A. Nagorni // Bulletin of Kharkiv National Technical University of Agriculture named after Petr Vasilenko. - 2014. - Vol. 144. - P. 97-102.
3. Regulation (standard) of accounting 7 "Fixed assets", approved by the Order of the Ministry of Finance of Ukraine dated April 27, 2000 No. 92 [Electronic resource]. - Access mode: <http://buhgalter911.com/Res/PSBO/PSBO7.aspx>
4. Methodical recommendations on the accounting policy of the enterprise, approved by the Order of the Ministry of Finance of Ukraine dated June 27, 2013 No. 635 [Electronic resource]. - Access: http://buhgalter911.com/Res/Zakoni/MetodRek/metod_uchet_polit.aspx
5. Methodological recommendations on the accounting of fixed assets, approved by the Order of the Ministry of Finance of Ukraine of September 30, 2003 No. 561 [Electronic resource]. - Access mode: <http://buhgalter911.com/Res/Zakoni/MetodRek/osnsredstva.aspx>
6. Lupenko Yu. O. Scientific software techno-technological update of agrarian production in Ukraine / Yu. O. Lupenko, O. Zakharchuk, M. M. Mogilov // Economy of agroindustrial complex. - 2017. - № 5. - P. 5-12.
7. Regulation (standard) of accounting 7 "Fixed assets", approved by the Order of the Ministry of Finance of Ukraine dated April 27, 2000 No. 92 [Electronic resource]. - Access mode: <http://buhgalter911.com/Res/PSBO/PSBO7.aspx>
8. Skotsik V. E. Organizational-economic aspects of reproduction of agricultural machinery in the leading countries of the world / V. Y. Skotsik // Visnyk KhNNU. Series: Economic Sciences. - 2016. - No. 2. - P. 178-186.
9. Navrotsky Ya. F. State support as a factor in the regulation of the domestic market of agricultural machinery in Ukraine / Y. F. Navrotsky // Bulletin of the Kherson State Technical University. Series: Economic Sciences. - 2017. - No. 3. - P. 338-346.
10. Zakharchuk O.V. Problems of logistical support of agricultural enterprises of Ukraine / O. Zakharchuk // Economy of agroindustrial complex. - 2014. - No. 7. - P. 92-99.

Received: 03.12.2018

Reviewed: 11.12.2018

Accepted to publishing: 17.12.2018