Status and trends of agricultural enterprises in Ukraine in terms of market agricultural machinery

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Abstract. The problems of land use and functioning of agricultural machinery and their impact on the development of agricultural enterprises in Ukraine were considered. The measures to improve the efficiency of land use were proposed. The necessity of diversification of domestic agricultural enterprises for sustainable development of the agricultural sector was justified.

Key words: agricultural machinery, size of enterprises, farms, land resources, agricultural technologies.

INTRODUCTION

Providing the population with basic food in sufficient quantity and quality required for food security is inextricably linked to issues of effective use of modern technologies and highly productive agricultural machinery in agricultural enterprises. But the current state of agricultural machinery that is in use in agricultural enterprises is unsatisfactory. To accelerate the development of technical capacity we have to carry out some drastic steps in restructuring the national market system of agricultural machinery.

ANALYSIS OF RECENT RESEARCHES AND PUBLICATIONS

The functioning of the global system of food security is directly related to the efficiency of more than 570 million farms, including farms [1, 2], using different machinery and technology [3-5]. Most of the farms according to the World Bank [6] are placed in countries with low (36%) or below average income (47%). In countries with average incomes are 13% of enterprises, and a high - 4% [7-9]. Numerous sources [10-16] indicate that the average size of farms and the distribution of agricultural land in the world is not constant and varies according to the level of the countries’ development. Thus, according to the assessment [17] small farms (of less than 2 hectares) owned approximately 75% of agricultural land in the world. Medium size enterprises decrease in most countries with low and below-average income levels [18]. At the same time, the size of farms increases for countries with high and middle income and in almost all countries with high level of income. Despite the tendency to increase the area of agricultural land that is in use of one farm in high-income countries, data on the optimal size of farms is controversial. For example for the USA, the average size of farms reaches 177 hectares. At the same time, a number of states are characterized by the overwhelming presence of small farms with an area of 50 hectares, and for some it is increased to 1500 hectares. Data on the optimal size of agricultural enterprises in Ukraine is also controversial [19, 20].

According to studies [22, 23], the optimal area of farm land using traditional methods of cultivation which provides the greatest efficiency due to economic zones in Ukraine make: for forest-steppe 3.5-6 thousand hectares, Stepp 6-8 thousand hectares and Polesie - 2 -4 thousand hectares. This area was also mainly a characteristic for 1990 to collective farms and state farms. For the vast proportion of modern agricultural enterprises of Ukraine optimum area usage is much lower [23]. Thus, some scholars believe [24, 25] that the optimal size is an area of 350-400 hectares of agricultural land. At the same time it is believed that the most efficient use of tractor fleet is for size that reaches 350-1000 hectares of farmland. [26] However, the following recommendations are made without regard to ownership and the dynamics of its change [27]. There is also no analysis made for trends to ensure the farms equipment, including tractors and harvesters, which are an indicator of the efficiency of farms.

Thus, issues related to the definition of optimal land use areas and the main components of logistic support of agricultural enterprises require in-depth research.

The purpose of the research is to assess the status and trends of land use and functioning of agricultural machinery and their impact on the development of agricultural enterprises in Ukraine, development of practical recommendations for their improvement.

MAIN RESULTS

According to the State Agency of Land Resources of Ukraine, rapport 2015, of 60.35 million ha territory of Ukraine - 41.5 million ha (68.77%) are agricultural. They include 32.5 million hectares of arable land (half of them are black), 2.4 million ha of grasslands and 5.4 million ha of pastures. After a rapid reduction in the mid-90s beginning from 2010 agricultural land is gradually increasing and approaching the level of 1990.
The main trend in the restructuring of agricultural land in Ukraine is a redistribution of areas classified as fallow, perennial plants, hayfields and pastures upward arable land (Fig. 1).

Out from 41.5 million hectares of agricultural land, 30.8 million hectares are privately owned by 6,920,000 Ukrainians (such as land parcels, shares), the state owns about 10.7 million hectares, communal property makes 0.4 million hectares.

Ukraine has a moratorium on the sale of agricultural land. Agricultural producers carry out their activities mainly on leased land, particularly at 84.5% (17.4 million ha) of agricultural land. Land owners are mostly retired people due to high migration of the working age population in the city. Today the land is usually leased for 4-10 years, while the maximum rental period reaches 49 years. The rates of land rents range from 296 UAH per 1 hectare per year to 1327 UAH (an average of Ukraine UAH 727.6). However, a large proportion of rental payments in Ukraine, according AGRICISTRAD are made in natural form.

The area of land owned or used by agricultural enterprises decreased by 23,903.9 thousand ha (39.6%), while slightly increased their size. The area of land that is actually used by citizens, by contrast increased by 14,881.6 thousand ha (24.7%); area of land owned or used by institutions, organizations, industry and other enterprises has remained almost unchanged as in 01/01/2015 p. was 2309.8 thousand ha, which is 28.0 thousand ha less than as it was in 01.01.1995. Land area of forestry enterprises increased by 1666.0 thousand ha (2.8%); reserve land area increased by 7421.8 thousand ha (12.3%) and make 10,775.7 thousand hectares. The rest of the land - 863.7 thousand ha is owned or use by other land users, this area is almost unchanged compared with 1994.

At the beginning of independence of Ukraine large state farms and collective ownership dominated. Number of farms and auxiliary enterprises was small, but eventually formed various forms of agricultural business. So during the 1992-2014 number of farms has increased in 3 times, the area of farmland per 1 farm - in 7.2 times, and the area of arable land - 7.7 times. The greatest intensity of growth for farms in 1992-1995 was related to the adoption of the Law of Ukraine "On peasant (farmer) households» №2009-XII from 20.12.1991. Such a rapid dynamics (20-30 households per month) was due the possibility of obtaining free of charge up to 50 hectares of arable land and 100 hectares of agricultural land to create farms. After reaching the maximum number of farms in 2002-2003 their number gradually began to decline (by 12% compared to 2014) due to the consolidation and increase of agricultural land (44%).
One of the trends of the last period is the reduction of arable land consisting of farmland from 2012 to 2014 to 7%.

Comparison of the number of farms and land area (Fig. 2a), which are in use, revealed the following. In the high-yield countries (USA, Germany, Denmark, etc.) the main share (up to 75%) are small farms with a size of 50 hectares of farmland. This allows the countries to create a significant number of jobs. However, the main area of agricultural land (48%) owned farms with an average size of 500-1,000 hectares. These farms provide up to 75% of GDP in developed countries. In Ukraine, a large proportion of farms has an area of over 1,000 hectares. The need to have such large areas to provide the appropriate level of production indicates a lower efficiency of land use than in developed countries. This is especially due to the low availability of agricultural technologies and problems of farms with modern equipment. The structure of existing agricultural enterprises of Ukraine by types of business entity in 2014 and the level of provision of agricultural machinery are shown in Fig. 2.

The level of provision of farms by machinery is inadequate. Annually no more than 2% of the existing fleet is updated. It should also be noted that about 80-85% of equipment in farms is located outside the depreciation and economically reasonable working life (over 50% of tractors and combines are older than 20 years), so they can not ensure effective use of modern technology and farming, they are energy intensive compared to new ones. At the same time in Ukraine were developed a large number of technologies and materials that can significantly extend the life of the used vehicles [27, 28].

In the period 2010-2015. Tended to reduce the number of tractors and combines in agricultural enterprises, due to the substantial decline in purchases of new technology medium and large farms (Fig. 3) and the failure of the old.

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**Fig. 2.** Structure of existing agricultural enterprises of Ukraine by types of business entity (a) and the level of provision of agricultural machinery (b). **Source:** Based on Agravery.com
Fig. 3. Availability of tractors and combine harvesters in agricultural enterprises (a) and households (b)

In households we marked the upward trend in increasing the number of vehicles in the period mainly due to its purchase on the secondary market (5% of tractors and combines 3%).

There has been intense market development of tractors and motor blocks used in households. During 2010-2014 it increased up to 58%.

Assessment of tractors and combines’ presence in the context of legal forms of entities revealed the following (Fig. 4).
Fig. 4. The presence of machinery in agricultural enterprises by types of business entity in 2014: a-d - tractors of different power; f-g - harvesters


Farms are characterized by use of medium power tractors of 40-60 kWt and 60-100 kWt. This is due to the fact that the size of the areas that are in cultivation is insignificant 20-1000 ha. Farm enterprises, with larger area of cultivation, are characterized with the presence of tractors with a capacity over 100 kWt. State enterprises and cooperatives owning a small proportion of tractors mainly of low power - 40-60 kWt. A large proportion of combines, which is 75-80%, are grain harvesters.

Ukraine after independence reduced the production of tractors almost in 50 times and currently upgrading their fleet is possible by competitive domestic production technology and imports. However, after the actual collapse of public support programs for budget allocations for the development of domestic engineering for agriculture in 2010, most of the tractors were exported abroad (Fig. 5). In recent years, there was a significant redistribution of the market. So, compared to 2011, exports to Russia in 2016 decreased by 65%. At the same time a redistribution of technology shipped to Kazakhstan took place and it changed toward the development of new markets - Italy, Poland and Egypt.
Fig. 5. Exports of tractors of domestic production for 2011-2016. Source: According to the State Fiscal Service of Ukraine. Data for 2016 were taken in the first quarter of this year.

The devaluation of the national currency, lack of support (including changing the tax code and the abolition of the special VAT regime) and high cost of credit resources in Ukraine in recent years has led to a significant reduction in imports of new technology (Fig. 6) and the reallocation of priorities towards cheaper counterparts - machinery from Belarus and one that was in use. Note that importing countries today do not have the predominant influence (Fig. 7), which was in early 2000. In 2011 the Belarusian tractor plant products ranked first for sales to Ukraine (about 25%). However, during the 2012-2014 the share of tractors decreased to 15.42-18.16%, due mainly to the purchase by farms more powerful tractors with power more than 100 kWt. Number of purchased by farms of Ukraine new tractors and the amount of money spent by their groups of power is shown in Figure 8.

Fig. 6. Number of new (a) and used (b) tractors that were imported to Ukraine, million USD
Production of utility tractors John Deere, CNH (Case, New Holland), AGCO (Fendt, Massey Ferguson, Challenger) come mainly from the USA ($83.857 \text{ mln USD in 2014}$), the Netherlands ($23.128 \text{ mln USD in 2014}$) and Germany ($27.550 \text{ mln USD in 2014}$). At the same time we build up supplies of tractors for small enterprises from China ($48.345 \text{ mln USD in 2014}$). However, the crisis has led to pent-up demand on the part of farmers to buy new powerful technology products and increased the share of Belarusian and domestic tractor factories in Ukraine (Fig. 9).
Fig. 8. Number of purchased tractors (a) the amount of money spent (b) by groups of power. *Source:* According to the State Statistics Service of Ukraine

Fig. 9. The brand composition of the purchased by agricultural enterprises agricultural machinery in 2014 by power: a - less than 40 kWt; b - 40–60 kWt; c - 60–100 kWt; d – more than 100 kWt. *Source:* According to the State Statistics Service of Ukraine
Among the combine harvesters there are the most popular brands - John Deere (29%), Case (16%), Claas (14%) Tucano (11%) and the Lexion (9%). The share of these brands in the segment of combine harvesters is over 50%.

The largest suppliers of combine harvesters for the period 2011-2015 were Germany, USA, Belgium, Poland (Figure 11).

**Fig. 10.** Number grain harvesters purchased by agricultural enterprises in Ukraine in 2014. **Source:** According to the State Statistics Service of Ukraine.

**Fig. 11.** Import of harvesters to Ukraine for 2011-2016. **Source:** According to the State Fiscal Service of Ukraine. Data for 2016 were taken in the first quarter of the year.
Market of imported equipment in 2015 decreased almost threefold compared to 2014. At the same time import of equipment that was in use declined by only 20%. Used equipment for Ukraine comes mostly from North America and the EU. In fig. 12 we represented the largest grounds for the sale of used equipment.

![Fig. 12. Size of the grounds for sale of used vehicles imported to Ukraine in 2016](source: According www.mascus.com.ua)

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<th>Country</th>
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![Fig. 13. The largest number of proposals under the brand of agricultural machinery and trading grounds in North America and Europe in 2016. Source: According www.mascus.com.ua]

CONCLUSIONS

1. In high-income countries (USA, Germany, Denmark, etc.) the bulk of households (75%) are small farms with a size of 50 hectares of farmland, which create a significant number of jobs. The main area of agricultural land (48%) owned farms with an average size of 500-1,000 hectares, providing up to 75% of GDP in developed countries. In Ukraine, the share of agricultural enterprises has an area of 1,000 hectares and is bigger almost 20 more times, as an evidence of the low efficiency of land use. This is a low level of agricultural technologies and problems of agricultural enterprises’ supply with modern equipment.

2. Despite of inflation in the economy in 2015 the received funds our farms are investing primarily not to bank accounts but buying modern tractors and combines to cultivate their farms and households in the region. Other farms refuse to purchase technology that formed a significant amount of pent-up demand that can provide an intensive agricultural machinery market growth in the future.

3. The main areas of efficient use of land resources is the use of modern technology that will increase productivity without expanding agricultural land, minimizing the cost of rent, administration and logistics. Diversification of production through the expansion of
business activities, focus on its own production and deep processing of agricultural products will increase the profitability of agricultural enterprises.

REFERENCES


