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EFFICIENCY OF AGRICULTURAL PRODUCTION OF FARMING ENTERPRISES

The paper studies theoretical issues concerning efficiency of agricultural production of farming enterprises. Factors influencing efficiency of agricultural production of farming enterprises were analyzed. Methodical foundations and practical recommendations for effective farming and further development of farming enterprises were given. The paper shows that profitability of smaller farms is in several times lower than the one of large farming enterprises. High efficiency of farming enterprises is provided by more optimal correlation of basic factors of production - land, capital and labor. With intensification of production at both large and small farming enterprises profitability is reducing, but profit per 1 ha of arable land are growing up.

Key words: farming enterprise, level of profitability, lease fee, level of intensification, agricultural products, efficiency, production.

Statement of the problem. Market reforms in national economics caused formation of a mixed economic system in agricultural sector, where, along with public, private, leased enterprises, business entities and production cooperatives farming enterprises have been developed. They should not be considered as an alternative to large enterprises, but as their necessary addition that could fully discover and use potential of agriculture. In such a way, functioning of farming enterprises creates conditions for increasing of the agrarian economy efficiency, expanding boundaries for searching of rational forms and methods of usage of natural and economic resources in agricultural production. Necessity for further efficient development of farming enterprises is obvious as they provide completion of volume and the range of agricultural products, rational usage of material and human resources, saving investments in agriculture, efficiency and productivity of land usage, reduction of losses of agricultural products; local budget replenishment and so on.

The analysis of recent researches and publications. Problems of efficiency of agricultural production by farming enterprises were studied by a range of domestic and foreign scientists, in particular, by M. Becker, Yu. Bilyk, I. Buzdalov, P. Gaidutskii, L. Gnatishin, V. Gorevoy, V.Zbarskii, E. Kasl, A. Konigin, M. Krapivka, V. Lipchuk, P. Makarenko, A. Makedonskii, M. Malik, V. Mesel-Veseliak, L. Moldovan, A. Nelson, P. Sabluk, A. Tretiak, N. Fedorov, B. Cherniakov, M. Shulskii and many of other researchers.

Parts of a general problem, which have not been considered yet. Theoretical and methodological issues about elimination negative impact of factors which restrain development of farming enterprises in present conditions were not properly studied. It is about destructive influence of agricultural holdings on functioning of farming enterprises, lack of calculated long-term state system of financial and credit support of small producers, as well as issues related to optimization of the size of farming enterprises of various specialization.

Aim of the article is to develop theoretical and methodological bases and practical recommendations to ensure the effective operation and further development of farming enterprises

Presentation of the basic material. During establishment of a farming enterprise there is a problem how to achieve such a size of an enterprise to make it not only commercially viable, but also provide full employment and the level of income sufficient to meet the needs of a farmer's family. Not only the efficiency, but a product gained by increasing the size of a farm and the volume of production, respectively, starts playing the main part (Table. 1).

Table 1.

**Grouping of Ukraine farming enterprises as per arable land and their relative effectiveness,
2014**

Groups according to the area of arable land per farm, ha	Number of enterprises	Profit, dol.					incl. per 1 farm member per month, dol.	Remuneration of labor per 1 farm member per month, dol.
		per 1 ha of land	per farm	per 1 employee	per farm members			
0	1014	15,96	304,46	123,94	241,2	15,92	1,33	
0-0,5	83	90,82	754,65	216	569,41	35,81	2,98	
0,51-1	190	216,54	592,33	337,95	559,92	44,1	3,69	
1,01-2,5	990	51,27	140,02	103,67	125,22	9,33	0,79	
2,51-5	2615	15,92	76,23	54,13	64,37	4,52	0,37	
5,01-10	2964	20,39	182,55	131,44	158,84	11,52	0,95	
10,01-15	2011	14,55	210,9	143,96	180,35	12,85	1,08	
15,01-20	1902	16,29	323,52	220,64	272,17	19,07	1,58	
20,01-25	1793	18,32	452,73	312,7	379,32	26,49	2,2	
25,01-30	1803	11,65	352,04	236,85	294,01	20,48	1,7	
30,01-40	2646	14,47	544,41	344,29	470,3	33,87	2,82	
40,01-50	5636	14,84	731,52	479,59	621,39	43,98	3,65	
50,01-60	1004	25,99	1491,61	785,33	1243,86	86,42	7,21	
60,01-70	639	38,13	2591,3	1310,01	2064,62	137,08	11,44	
70,01-80	566	24,29	1930,32	890,45	1462,59	92,35	7,71	
80,01-90	524	18,2	1619,86	719,92	1320,04	89,66	7,46	
90,01-100	563	22,47	2210,61	878,3	1770,36	118,13	9,87	
100,01-125	780	25,7	3012,48	1119,46	2361,53	154,28	12,85	
125,01-150	633	24,58	3504,08	1171,11	2634,32	165,02	13,76	
150,01-200	861	25,49	4611,86	1284,64	3542,22	226,74	18,9	
200,01-250	607	26,49	6063,3	1568,79	4785,99	314,82	26,24	
250,01-300	468	28,81	8139,49	1800,21	5980,02	366,13	30,51	
300,01-400	642	35,32	12495,01	2025,7	9023,38	543,05	45,26	
400,01-500	505	34,32	15601,83	2285,06	12158,85	789,64	65,78	
500,01-600	299	36,48	20317,52	2208,25	14464,13	858,07	71,5	
600,01-750	324	41,2	28057,71	2816,21	19259,95	1101,72	91,81	
750,01-900	215	46,05	38332,62	3452,64	29433,96	1883,44	156,93	
900,01-1250	125	51,03	49838,41	3521,66	39429,12	2599,5	216,62	
1250,01-1500	12	50,53	68338,36	3980,89	58575,74	4184	348,68	
1500,01-2000	10	33,08	60596,05	3884,35	46612,38	2987,98	248,99	
More 2000	4	8,62	21209,17	865,7	28278,9	3142,09	261,84	
Ukraine	32428	29,72	2430,88	1086,01	2012,35	138,82	11,56	

Source: compiled by the author on the basis of^d

As you can see, profit per 1 farm member per month is less than \$50, if the physical size of a farm is less than 50 hectares of arable land. It occurs in all climatic zones of Ukraine. It is upon condition that it is necessary for farming industry to form not only a consumption fund but also an accumulation fund for investments in expansion of farming enterprises and acquisition of technical equipment.

Thus, farming enterprises with the size of 50 hectares of agricultural land neither even able to provide part-time employment of their members, nor get the level of profits that is enough for consumption,

^dБаза данных «Основные показатели хозяйственной деятельности фермерского хозяйства за 2014 г.» (2014). (форма № 2 – ферм).

nothing to say about any accumulation of funds. If we take into account that marketability of small farming enterprises is low, the level of estimated profit is to be significantly lower, as revenue from sale of agricultural products is supposed to exceed all operating costs, not just a minor part of the sold products. Therefore, the monthly total revenue without all costs of farming enterprises per one family member is less than 41 dollars at enterprises which physical size is fewer than 125 hectares and less than 82 dollars – at the enterprises which size is fewer than 300 hectares of agricultural land.

Thus, each group of farming enterprises with an increase of its physical size has more capital and labor than small farms. Considering a farming enterprise which area exceeds 500 hectares, we may assume that from 5 to 10 times bigger plot of arable land and from 2 to 3 times bigger amount of capital may be accrued to 1 employee, while per 100 hectares basis the amount of capital and employees decreases. A higher capital-labor ratio and land area load on employees in large farming enterprises provides increase of labor and land productivity, as well as saves technology resources per unit of output. The correlation obtained in crop farming and cattle breeding income per 1 ha of land (W) is determined by this equation ($R = 0,941$):

$$W = 5,833329 \cdot S + 0.144346 \cdot K,$$

where S – land area per 1 employee, ha;

K – the cost of capital attributable per 1 employee, in thousands of US dollars.

Therefore, there are no reasons to agree with the following statements of some scientists that Ukraine has successfully copied three models of high-efficient agriculture as per farm size: Japanese-Chinese (0.2-5 hectares), European (5 - 100 ha) and the US (100 – 2000 ha).¹ Even European and American models do not provide full-time job and profitability to all farmers, which would guarantee a decent life for their families. Analyzing the Japanese model 20 years ago, European scientist Michael Tracy wrote that in the densely populated Japan there are very small farming enterprises (2 ha on average), and, as a rule, people work there in their free time, and for these people agriculture is not the main source of income. Issues of food security forced the Japanese government to make eight-time increase of rice price, in comparison with the one on the world market, causing its overproduction. At the same time, in the domestic market the rice is sold to consumers at a lower price that causes the state budget deficit.² That is how the Japanese model works. It has been extensively introduced in our country's agricultural structure since the beginning of reforms and it still exists in the mind of some reformers. In Ukraine, for owners of land shares, unlike for farmers in Japan, there is no other basic work and employment options in any industry. The only way out for many of them is to seek a better life abroad. On the other hand, the state budget has no means to pay 5-10 times more for products of smallholder farmers like in Japan or to support those who leased land share at a low rate (8.29 - 16.58 dollars. per 1 ha). Therefore, the Japanese model was not acceptable for a poor country. It is a product of Japan itself, as a variant of support of small-scale production in the presence of farmers surrounded by different fields of activity with a high level of payment.

Ukraine should take into account current realities and do not blindly copy foreign experience. After all, developed countries at the start of their civilization have had their ever-changing economic and social conditions, and institutional base helped farmers to adapt to new realities and thus function effectively. In any case, the efficiency has been derived from rational usage of the basic factors of production - land, capital and labor.

Successful optimization of combination and size of the mentioned main factors, and management according to their value and initial conditions for organization of farming enterprises are starting conditions for their further effective functioning. Depending on the price of the land, its lease, payment levels, cost of technology, availability of credit and the bank interest in correlation to their use, a wide range of issues that require rational solutions in organization of the farm may arise. Their changes and relative prices or costs and limited individual resources depend on current and future optimal farm size at each stage of its operation. That is, the cost and the size of the farm are vital for the efficiency of farming enterprise functioning.

Scientists have analyzed activities of foreign companies and admitted that minimum area for an

¹Месель-Веселяк, В. Я. (2010). Реформирование аграрного сектора экономики Украины (достижения, проблемы, решения). *Вестник экон. науки Украины*, 2, 205-211.

²Тресли, М. (1995). *Сельское хозяйство и продовольствие в экономике развитых стран: введение в теорию, практику и политику*: пер. с англ. В. А. Макеева; под ред. А. Г. Слуцкого. Санкт-Петербург, Экономическая школа. 431.

efficient farming enterprise is that provides two employees with full-time job during the year and, according to official statements - a salary at the level of industrial employees¹. Farm of such size may be developed not necessarily on a land and with equipment owned by them. Lease of a land in a transparent market environment in all countries is a guarantee for formation of a combination of basic production factors - land, capital and labor, which will always allow farmers adapting to natural and market environment and be competitive.

However, will the farmers be able to lease land plots and privatize them later if there is a demand on land plots from powerful corporations and holding companies, whose short-term goal is to join the free land market? (figure 1)

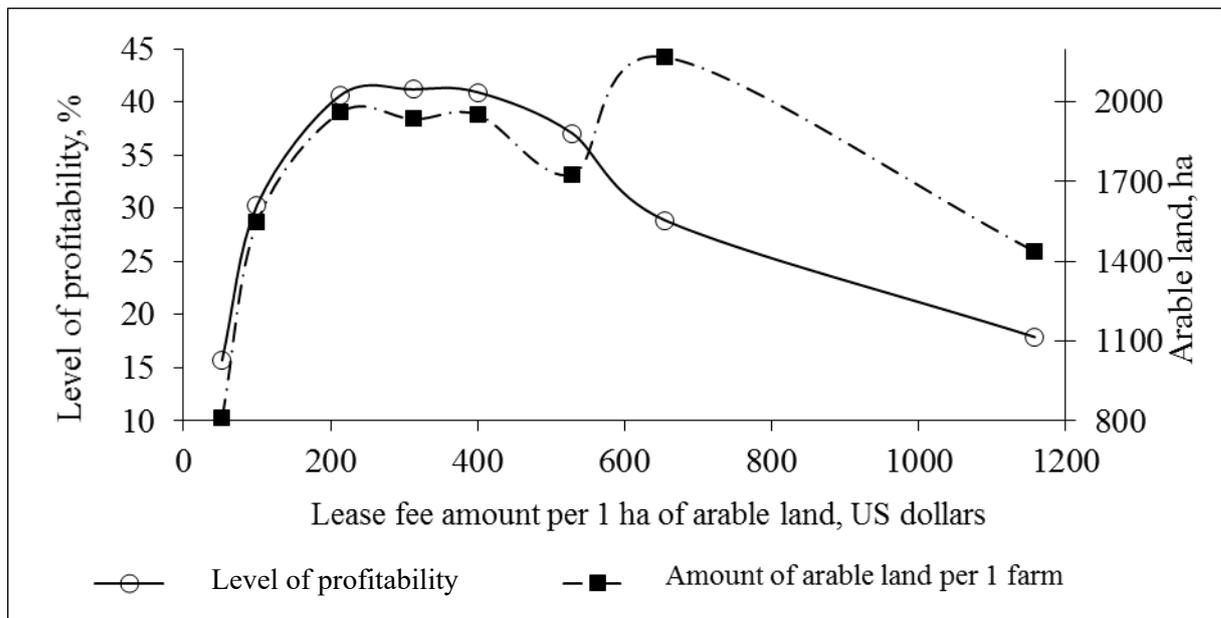


Figure 1. Interdependence of the level of profitability, the physical size of large farming enterprises and lease fee amount per 1 ha of arable land, 2014
(developed by the author according to the data)²

As the analysis shows (fig. 1), large farming enterprises (which are accounted on the statistical form No. 50 – agricult.) have reached the highest level of profitability (35 – 45%), on condition that they have paid 12 – 16 US dollars for the lease per 1 ha of arable land and physical size of arable land is 1,800–2,000 hectares. At the same time 16% of farming enterprises of this physical size had a lower level of profitability in production (20 – 35%), that is connected with a high lease rate for them, which is 24.5 – 50 US dollars per 1 ha of arable land leased. It is likely that such a high lease rate, which is 13 – 24% of total operating costs, can be explained by the increase in demand for the land lease from holding companies. At the same time 26% of farming enterprises which are 800 – 1,500 ha of arable land in size had a 10 – 25% level of profitability and paid only 4 – 8 US dollars for the lease. At such a low lease level of this group of farming enterprises, in comparison with other groups, their prospect for further development is difficult, because it will require leaseholders increase the lease fee, otherwise, they will terminate lease contracts. We should note that large farming enterprises lease 98 – 99% of arable land, therefore production expenses are increased because of the growing lease amount in such a proportion of leased arable land.

Smallholder farmers, grouped according to the lease fee amount, have 100 – 200 ha of land. We would like to remind that 23,152 farming enterprises, or 71.4% of their total amount, do not lease the land and each of them has 30 ha of arable land available on average. At the same time 80% of farmers who leased the land level of lease fee was 3 – 15 US dollars per 1 ha of arable land in 2014. The area size of the land lease has decreased in small farming enterprises in case of increasing the level of lease fee per 1 ha of

¹Фудин, А. Ф. (1987). *Экономика сельского хозяйства зарубежных стран: развитые капиталистические страны*. Учебное пособие. Москва. УДН. 320.

²База данных «Основные экономические показатели работы сельскохозяйственных предприятий за 2014 г.» (2014). (форма № 50–сх).

arable land (figure 2).

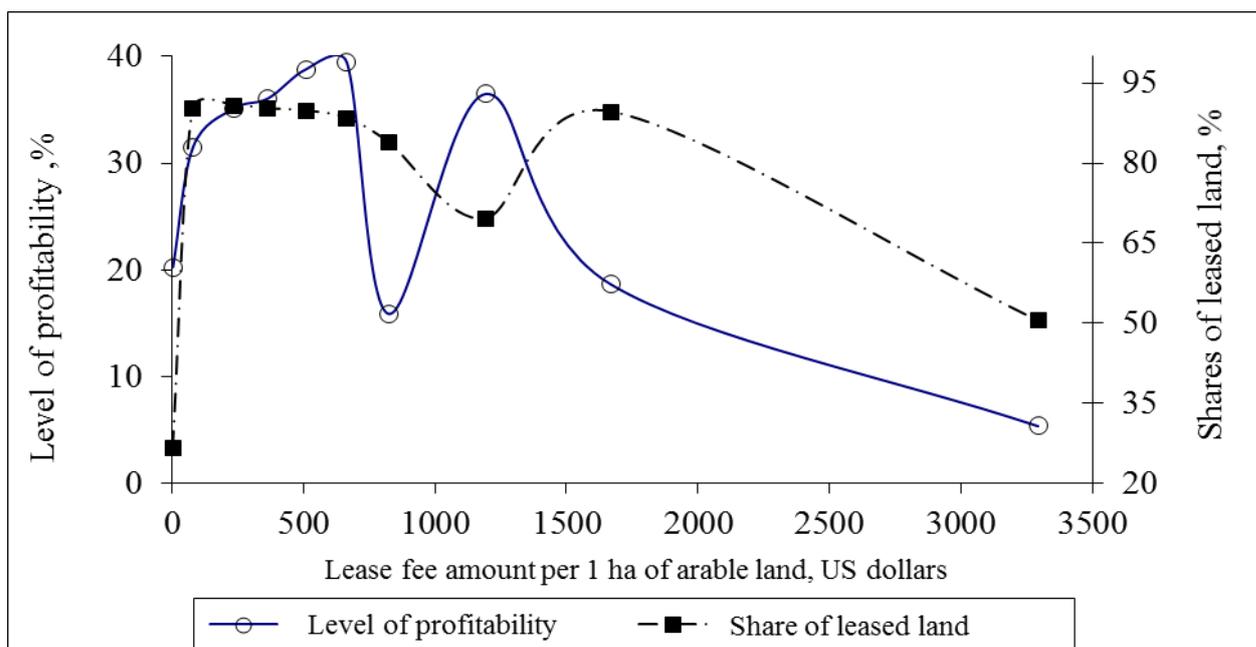


Figure 2. Interdependence of the level of profitability, the leased land and the lease amount in small farming enterprises, 2014

(developed by the author according to the data)¹

In small farming enterprises we can see a clear correlation between the level of profitability, the amount of lease fee per 1 ha of land and its share in the lease. If the lease fee, which follows the growing demand on land lease from holding companies, increases, the share of leased land and the level of profitability decreases. However, the level of profitability in agricultural production tends to grow in average, if the physical size of small farming enterprises is increased (figure 3).

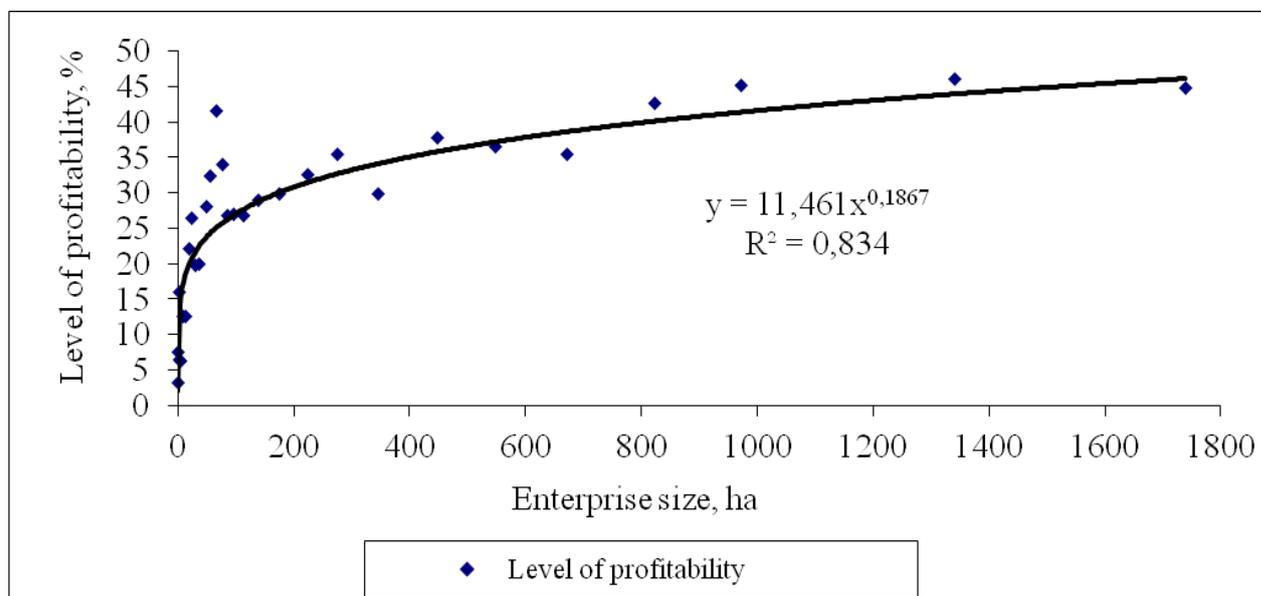


Figure 3. Dependence of production profitability in farming enterprises on their physical size, 2014

(developed by the author according to the data)²

¹База данных «Основные показатели хозяйственной деятельности фермерского хозяйства за 2014 г.» (2014). (форма № 2–ферм).

² *Ibid.*

The analysis shows that efficiency of farming enterprises, created by peasant farmers on the basis of their land shares, depends on the physical size of such formations. The highest profitability is seen in the enterprises, which have reached the physical size more than 300 ha. Almost all farming enterprises, which are 500 – 1,500 ha in size, have exceeded the 30%-level of profitability. In the smallest farming enterprises the level of profitability is much lower and can be varied in a greater degree. Thus, the efficiency is connected not only with the size of farming enterprises, but also with intensification of production.

A high level of profitability consequently means a maximum variance of selling price from the commodity output production cost. If a level of profitability is 70%, the selling price exceeds production cost by this value. As in Ukraine the market prices of agricultural products fluctuate significantly, the enterprises with a high level of profitability are less exposed to price risk. There is also no doubt that larger enterprises have a high intensification level.

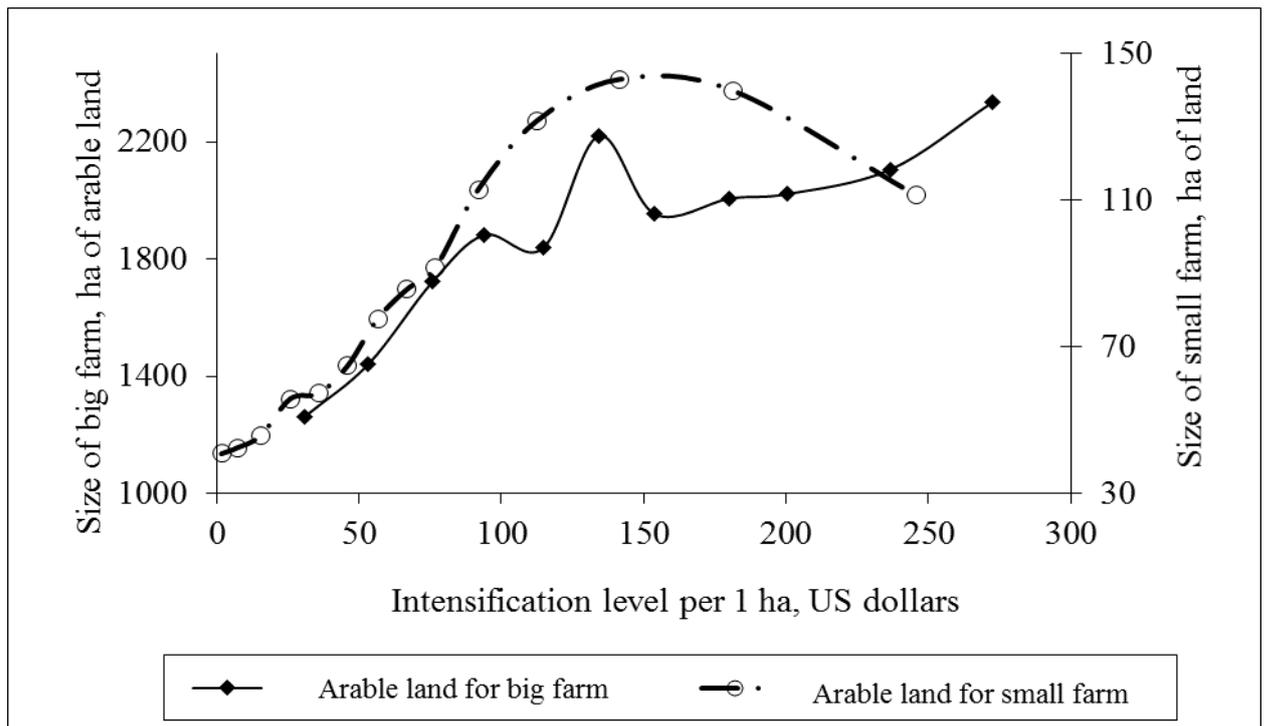


Figure 4. Dependence of the intensification level from the physical size of farming enterprises, 2014
(developed by the author according to the data)¹

The enterprises which occupy 1,800 – 2,500 ha of arable land belong to large farming enterprises accounted on statistical form № 50 – agricult., and enterprises which occupy 100 – 150 ha of land belong to small farming enterprises accounted on statistical form № 2 – farm. Large farming enterprises can form (and form) sufficient commercial batches of agricultural products, which will have a higher price under market conditions than small commercial batches. Small farming enterprises, created by peasant farmers on the basis of their land shares, have their segment in the market, where larger farming enterprises (70 – 150 ha of land) consequently have stable distribution areas, and consequently organize a more intensive production, that allows them to get a much higher level of profit per 1 ha of land than small farming enterprises (10 – 50 ha of land).

Thus, these three seed cultures in a structure of sown areas in less intensive farming enterprises took from 40 – 60% to 65 – 70% in more intensive farming enterprises. The growth was achieved mainly due to expansion of sowing maize for grain, operating costs during its growing are 40 – 50% higher per 1 ha than during the growing of winter wheat and sunflower seeds. The share of all other grain-crops in a sowing structure also decreased in inverse ratio of intensification level from 25 – 35% to 10 – 15%. Sowings of other agricultural crops in crop rotations take only 7 – 15%. In a commodity production structure cattle

¹База данных «Основные показатели хозяйственной деятельности фермерского хозяйства за 2014 г.» (2014). (форма № 2–ферм) и «Основные экономические показатели работы сельскохозяйственных предприятий за 2014 г.» (2014). (форма № 50–сх).

breeding sector of small farming enterprises with low production intensification takes only up to 2,5%, and up to 3,5% for more intensive farming enterprises. Actually, the similar tendency is observed in large farming enterprises: the share of cattle breeding sector in a commodity structure consequently increases as production intensification rises from 1 – 3% to 7 – 12%. It is surprising, but the same pattern is found in agricultural enterprises. In general, a structure of sown areas in farming enterprises almost does not differ from the structure in agricultural enterprises.

Conclusions and proposals. Thus, small farming enterprises have occupied their segment in the market, but by specialization they copy structure of sown areas of large-scale agricultural enterprises including large-sized farming enterprises. It is difficult for small farming enterprises to beat competition following such a structure, or at least to maintain their position in the market. They need to carve out their niche in production specialization, which is less available for large-scale enterprises, which are mainly specialized on cereal crops (wheat, maize) and oil-bearing-crops (sunflower, oilseed rape, soy) production. Large enterprises, 10 – 500 thousand ha of arable land in size, cannot develop labour-intensive industries because of the difficulty of their organization and management. Small farming enterprises can develop the dairy cattle breeding (50 – 100 cows) on the territory of 100 – 150 ha of agricultural lands.

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