

завданням для країни нині є створення умов для розвитку інвестиційно-інноваційної економіки, наявність широких зв'язків із зовнішнім світом, науково-технічна спеціалі-

зація, участь у світовому поділі праці, ефективне використання зарубіжного науково-технічного досвіду.

### Список використаних джерел

1. Hall B. H. The Financing of Innovation / Bronwyn H. Hall // December 2005. – P. 28.
2. Kubiš J. Policy Options and Instruments for Financing Innovation: A Practical Guide to Early-Stage Financing / Ján Kubiš // United Nations Economic Commission for Europe. – New York and Geneva. – 2009. – P. 62.
3. Реалізація пріоритетних напрямів розвитку науки і техніки та одержані результати у 2012 р. Аналітична довідка. – К., 2013. – С. 54.
4. Наука та інновації в Україні [Електронний ресурс]. – Режим доступу: <http://www.ukrstat.gov.ua/>.
5. Лапко О. Проблеми інноваційної діяльності / О. Лапко // Економіка України. – 2009. – № 8. – С. 93–95.
6. Принципи формування і механізми реалізації фінансової політики приватизованих підприємств: [моногр.] ; за наук. ред. д-ра екон. наук, проф. М. А. Козоріз // Інститут регіональних досліджень НАН України. – Львів: ЛБІ НБУ, 2004. – 358 с.
7. Терещенко О. О. Фінансова діяльність суб'єктів господарювання: [навч. посіб]. / О. О. Терещенко. – К.: КНЕУ, 2003. – 554 с.

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## Perspectives of bioethanol production of sugar beets in Ukraine

**Scientific problem.** Ukraine's geographic position, availability of favorable soil and good climatic conditions make it potentially attractive for growing sugar beets. In recent years, Ukraine has experienced deregulation of sugar beet production. Producers lose interest in the production of sugar beets, the crop that is very important in crop rotation. That causes inefficient work of sugar factories. The level of unemployment becomes higher, particularly in rural areas, import of sugar increases. Diversification of processes at sugar factories will enable to form a stable demand for sugar beets and increase the efficiency of the entire sugar beet industry functioning.

Constantly increasing demand and prices for fuel and energy resources, dependence of imports on natural gas, oil and its derivatives,

complicated ecological situation, that provokes climate change, all this make biofuel production in Ukraine extremely important and promising. Experience of such countries as the U.S., Brazil and European countries shows the effectiveness of processing agricultural raw materials and organic waste into biofuels. The solution to the problem of sugar-beet industry decline, dependence on energy import and environmental degradation may become the establishment of bioethanol production at sugar beet industry plants.

**The objective** of this article is to define the importance of biofuels production from sugar beet in Ukraine by analyzing the peculiarities of world sugar beet production, the current state of Ukrainian sugar-beet industry functioning, the situation at the world and domestic sugar market.

**Analysis of recent researches and publications.** Many leading foreign and local scientists, including Robert C. Brown [2],

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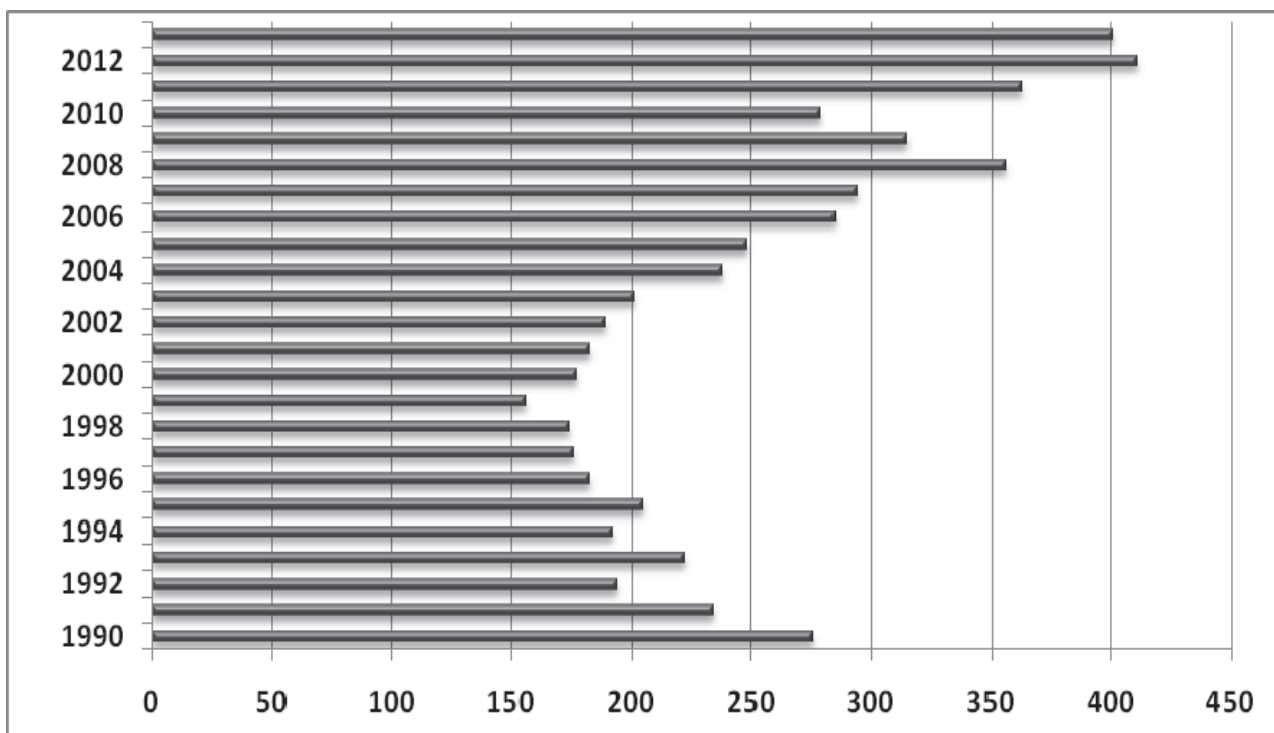
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M. Dimitru, I. Gherman [4], H.M. Kaletnik [6], A.I. Ukrainets, L. M. Homichak, P. L. Shiyan [9], S.T. Oliinichuk O.M. Shpychak, Y.B. Blum [1] and many others devoted their scientific works to the study of bioethanol production and consumption. However, a deeper study of the issue requires the production of biofuels from sugar beet under the conditions of Ukraine. The importance of this problem is determined by the low efficiency of the sugar-beet industry functioning and the fuel and energy import dependence of Ukraine.

**Statement of the main results of the study.**

In 1990 Ukraine was the world leader in the production of sugar beet. In 2012, despite a significant reduction in total sugar beet production, Ukraine took the 5th place in the world rank after Russia, France, the USA and Germany. The sugar beet yield per hectare in Ukraine compared to other countries remains relatively low (Fig. 1). Thus, in 2011, the yield in Ukraine was indicated as 3,63 t/ha ranking

the 31 place in the world. However, in France, that is located in the same climate zone as Ukraine, the yield was 9,47 t/ha [5]. In 2012, the yield in Ukraine slightly increased and reached 4,11 t / ha (the 26<sup>th</sup> position in the world). If the yield of sugar beet in Ukraine was the same as in France (9,47 t / ha), total production would reach 43,372 thousand tons, that would allow Ukraine to take the 2nd place in the world. Such low yields compared with other countries, means that soil-climatic potential of Ukraine is not used effectively. One of reasons that causes low yield of sugar beets in Ukraine is the lack of motivation for their cultivation. This is due to the low profitability of production, constant sugar market price fluctuations, unstable demand for sugar beets, and reduction of operating plants. Lack of motivation is not favorable to the development of technology, seed-farming, investments in the sugar-beet industry, as production of sugar beets every year becomes less profitable for farmers.

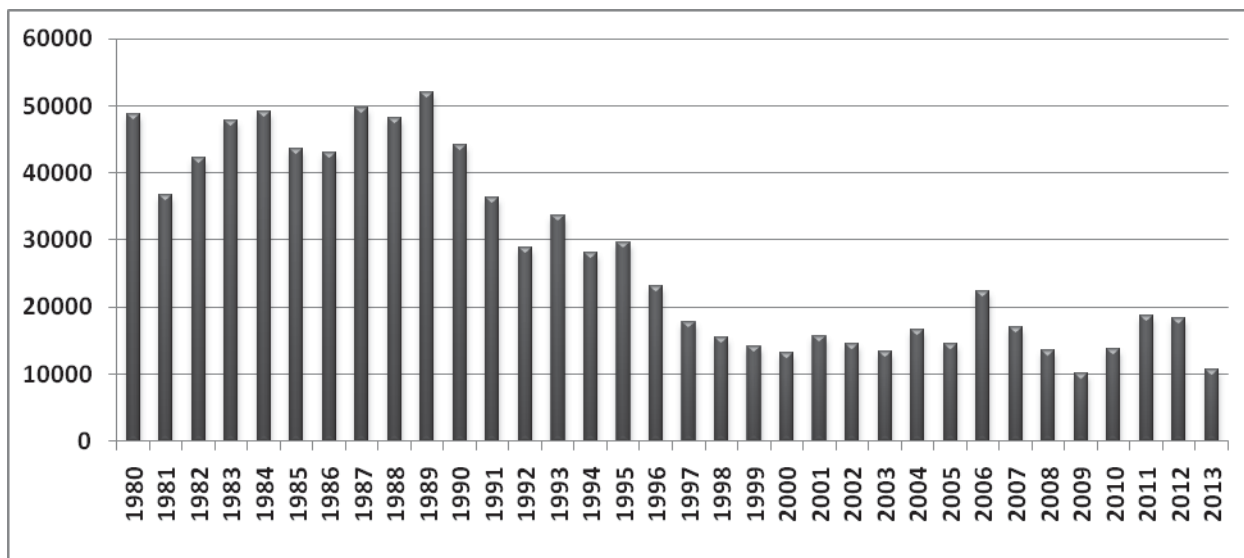


**Fig. 1. Dynamics of sugar beet yield in Ukraine, t / ha (1990-2013 years)**

Source: Created by the author on the basis of [8].

The analysis of sugar beet production in Ukraine shows that since the early 1980s to the present time production capacity of these agricultural crop has decreased 5 times (Fig. 2). After a sharp decline in production in the early

1990s, a slight increase in gross yield began since 2001. However, despite the gradual increase in gross yields, sugar beet production in Ukraine is characterized by cyclic recurrence and instability.



**Fig. 2. Dynamics of sugar beet production in Ukraine, thousand tons (1980-2013 years)**

Source: Created by the author on the basis of [8].

The decrease in gross yield of sugar beet had a negative impact on the work of sugar plants in Ukraine. In 2000, 146 sugar factories were engaged in processing sugar beets. Their daily capacity at that time amounted to 405,67 tons. Unfortunately every year the number of operating sugar plants has been decreasing. 63 sugar refineries with daily capacity over 212,88 tons were engaged in the processing of sugar beets in 2012. As the average number of employees at a sugar factory is 500, reducing the number of operating refineries during 12 years has resulted in the loss of at least 41,500 jobs. Considering the loss of daily production capacity of operating refineries, the number of redundant workers will increase significantly. Reduction of sugar beet gross yield and, as a result, sugar production led to a decrease of revenue to the state budget and increase on disbursement of unemployment benefits. In case of permanent closure of processing plants and cutting jobs, Ukraine will not be able to cover liability on the budget for social services, pensions and salaries for doctors, teachers, firefighters, and other workers, whose wages are financed from the state budget.

To revitalize sugar-beet industry Government of Ukraine introduced a program with the aim to support the cultivation of sugar beet. For this purpose in 2008 Government planned to spend 750 hryvnas of state subsidies per 1 ha of crops. Cabinet of Ministers Resolution of 29 September 2010 № 897 identified the mechanism of subsidies for sugar beet production that

further will be processed on sugar of quotas "A" in the amount of 500 hryvnas per hectare. Considering that the planted area of sugar beet in 2010 was 495 thousand hectares, the estimated amount of payments was 247,5 million hryvnas. However, stimulation of sugar beet production and the consequent increase in their gross production without a stable market demand is not reasonable.

In the 2012/2013 marketing year (September 2012 - August 2013) due to shortage of working capital at sugar factories, the use of tolling scheme for the processing of sugar beets, seasonal oversupply on the domestic market, the fall in domestic consumer demand and lack of export, demand price of sugar in the domestic market during the period of sugar beet processing season has been decreasing daily and reached a level that does not cover the cost of sugar production. Average wholesale price of sugar from producers during this marketing year was about 4900 UAH per ton while the cost of its production was 6500-7200 UAH include VAT, and therefore losses of sugar producers already exceeded 1 billion UAH [3]. Lack of interest of agricultural producers to grow such important crop in rotation as sugar beet leads to reorientation into the production of export-oriented crops, cultivation and sale of which brings much higher profits (corn, rapeseed, soybean, wheat, etc.).

Analysis of the price of gasoline and diesel fuel in Ukraine indicates that in 2012, compared with 1999, prices have increased almost

15 times. At the same time, the selling price of sugar beet in 2012, compared to 1999 increased only 5,1 times (from 79,2 UAH. / t to 426,8 UAH. / t). Taking into the consideration the fact that agricultural production is directly linked to the prices of energy resources, such rapid trend of diesel fuel and gasoline growing costs makes agriculture production in Ukraine every year less profitable.

The situation on the world sugar market is characterized by its instability (Fig. 3). Prices fluctuate depending on supply and demand bal-

ance for sugar. So, last fall in prices in 2011-2013 is explained by an excess of sugar in the world markets at the amount of 8.1 million tons in 2011/2012 MY and 5 million tons in 2012/2013 MY [10]. Ukraine's access to foreign sugar markets is limited. In addition, sugar from sugar beets can not stand the competition with the cost of much cheaper sugar from sugar cane. However, even with free access of Ukraine to foreign sugar markets, it is difficult to predict what will be the future world sugar prices, supply and demand.

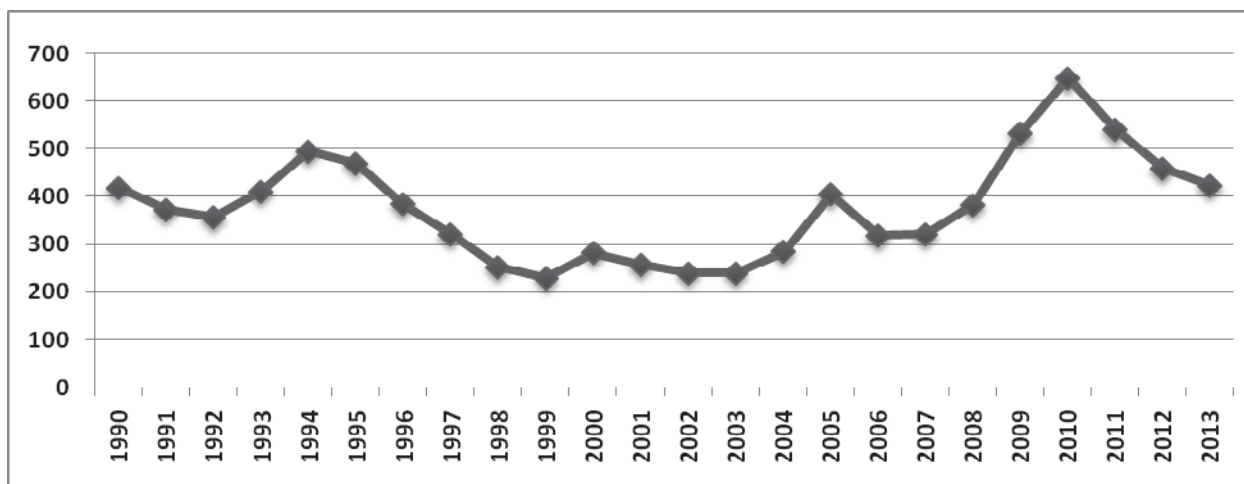


Fig. 3. World prices for white sugar, USD. / t

Source: Created by the author on the basis of [7].

The outputs of sugar beet in Ukraine and, as a result, sugar production are cyclical in nature. In years of deficient high demand for sugar encourages farms to increase the area under sugar beet, there is overproduction, falling prices, manufacturers are reducing sugar beet areas.

This leads to a deficit, which is covered by import of sugar from sugar cane. Then domestic market price for sugar rises, and farmers increase acreage again. As a result, sugar supply exceeds demand, prices fall, and the cycle repeats (Fig. 4).

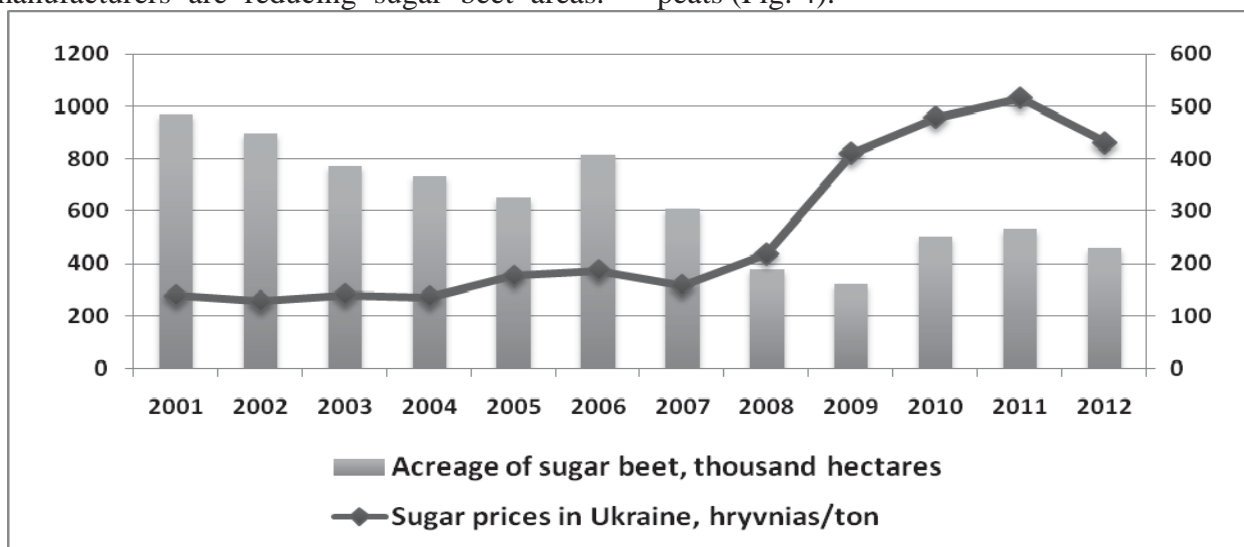


Fig. 4. Acreage of sugar beet and sugar prices in Ukraine (2001-2012 years)

Source: Created by the author on the basis of [8]

Domestic sugar consumption in Ukraine vary slightly from year to year and on average is 1,8-2,1 million tons. In addition, Ukraine as a WTO member, committed to import annually 260 thousand tons of raw sugar at a reduced rate of duty of 2%. However, analysis of the

dynamics of supply and demand balance in the Ukrainian sugar market shows a constant excess of sugar in the domestic market due to excessive imports of the product and limited access to foreign markets (Table).

### The demand and supply of sugar in Ukraine, thousand tons

	2005	2006	2007	2008	2009	2010	2011	2012
Supply								
Beginning stocks	183,7	558,9	1 265,2	1 181,2	854,7	390,3	521,1	1 348,5
Sugar production	1 896,7	2 595,0	1 859,0	1 573,0	1 267,0	1 545,2	2 330,0	2 226,0
Import	177,0	120,0	25,0	91,0	92,0	90,0	48,0	10,0
Supply of sugar, total	2 257,4	3 273,9	3 149,2	2 845,2	2 213,7	2 025,5	2 899,1	3 584,5
Demand								
Export	154,0	165,0	120,0	103,0	88,0	65,0	51,0	174,0
Industry consumption	661,3	722,3	742,4	779,1	639,4	600,0	661,2	620,2
Consumption by citizens	1 125,6	1 118,4	1 113,6	1 106,4	1 104,0	1 099,2	1 094,4	1 094,4
Total consumption	1 786,9	1 840,7	1 856,0	1 885,5	1 743,4	1 699,2	1 755,6	1 714,6
Total use	1940,89	2005,7	1976	1988,49	1831,4	1764,18	1806,6	1888,56
Ending stocks	316,5	1 268,2	1 173,2	856,7	382,3	261,3	1 092,5	1 696,0

Source: Created by the author on the basis of [8].

Store sugar over a long period of time is not favorable because it gets compressed, darkens, loses its consumer quality and consequently the price. Instead, the expiration date of ethanol is not limited. In addition, the demand for fuel is growing because of excess ethanol. Producers of bioethanol don't have to worry about insufficient demand for their product because the consumption of fuel is growing constantly.

In order to improve the efficiency of sugar-beet industry in Ukraine, that includes expanding acreage of sugar beet and, consequently, an increase in the production of sugar firstly we should create markets for raw materials. Due to the fact that Ukraine doesn't have free access to the foreign sugar market, we need to create a market for sugar beet in the country.

Experience of many countries shows that the simultaneous production of ethanol and sugar in a single plant helps not only reduce dependence on energy imports, but also stabilize the sugar market. Back in the early 1970s, Brazil began to produce ethanol at plants that processed sugar cane for sugar. Since 2000 France, Germany, Czech Republic, Great Britain and Poland also introduced the production of sugar and ethanol at the same plant. As a raw material, these countries, unlike Brazil, began to use not sugar cane but sugar beet. Volumes of sugar and bioethanol production are adjusted depending on market demand.

Due to such specific construction of the plant sugar beet growers don't have problems with the sale of raw materials in the years when the demand for sugar in the domestic market falls, and access to foreign markets is limited. Simultaneous production of ethanol and sugar in one production area stabilizes the functioning of sugar-beet industry and of entire agricultural sector.

In order to make the production of sugar-beet economically viable and cost-effective, it is necessary to establish territorial concentration of production capacity with short distance between sugar-beet fields and processing plant. We should consider a combination of solving the food and energy security when calculating the required acreage of sugar beet in Ukraine. A full cycle of using raw materials and by-products should be provided at the sugar beet plant while producing sugar and bioethanol in order to minimize their costs.

**Conclusions.** Thus, the ever-increasing price of energy sources and fuel leads to increasing cost of sugar beet, low profitability and, consequently, a decrease in the production of sugar beet and deregulation of sugar-beet industry. Limited access to foreign sugar markets makes it impossible to increase production of sugar beets without constant demand for sugar beet in Ukraine. Production of bioethanol from sugar beet will help to stabilize the industry, create jobs, provide additional revenues to the

government budget and improve the economic efficiency of sugar beet production. In addition, the production of bioethanol will allow Ukraine to reduce its energy dependence on imported fossil fuel and to improve the environmental situation in the country by reducing carbon dioxide emissions and other pollutants into the atmosphere. First of all for establishing biofuel production from sugar beet in Ukraine we

should overcome the lack of interest in the production of renewable fuels among oil exporters, establish mechanisms to attract foreign investment in bioenergy, improve the legislative system that would provide mandatory biofuel content in gasoline and diesel. Improvement of technological base of sugar beet production and use of high-performance hybrids will ensure high yields and efficient use of arable land.

### References

1. Biological resources and technologies of production of biofuel / Y.B. Blum, H.H. Heletuha, I.P. Hryhoriuk and others. – K.: Agrar Madia Group, 2010. – 408 p.
2. *Brown, Robert C.* Biorenewable resources: engineering new products from agriculture // USA: Iowa State press, 2003. – 286 p.
3. Committee on Agrarian Policy and Land Relations [Electronic resource]. – Source Access: <http://rada.gov.ua/news/Novyny/Povidomlennya/72953.html>.
4. *Dimitru M.* Researches on using sugar beet for producing biofuels (bioethanol and biogas) / M. Dimiteu, I. Gherman // Research Journal of Agricultural Science, 42 (1), 2010, p. 583-588.
5. Food and Agricultural Organization of the United Nations [Electronic resource]. – Source Access: <http://www.fao.org/corp/statistics/en/>.
6. *Kaletnik H.M.* The development of biofuel market in Ukraine / Kaletnik H.M.: monograph. – K.: Agrarian science, 2008. – 464 p.
7. OECD-FAO Agricultural Outlook 2013 [Electronic resource]. – Source Access: <http://www.oecd.org/site/oecd-faoagriculturaloutlook/>.
8. State Statistics Service of Ukraine [Electronic resource]. – Source Access: <http://www.ukrstat.gov.ua/>.
9. *Ukrainets, A. I., Homichak, L. M., Shiyani, P. L., Olynychuk, S. T.* 2007. Ukrainian alcohol industry on the path to innovative development. *Food and processing industry* 12: 16-19.
10. United States Department of agriculture [Electronic resource]. – Source Access: <http://www.usda.gov/wps/portal/usda/usdahome?navid=ENERGY>.

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## Новини АПК

### В Україні зростає виробництво тваринницької продукції

Країна нарощує виробництво основних видів тваринницької продукції. Так, у січні виробництво м'яса у живій вазі зросло на 8,6%, молока – 2,3%, яєць – 5,2%. По голів'я птиці у всіх категоріях господарств становить 225,6 млн голів, що на 9,3% більше до відповідного періоду минулого року.

Розвиток галузі тваринництва є одним із стратегічних завдань, що стоїть перед аграрним сектором економіки. Мінагрополітики України й надалі працюватиме над нарощенням цих показників. Адже крім наповнення внутрішнього ринку потенціалу вітчизняного тваринництва достатньо для нарощення експорту та розширення ринків збуту. Зокрема, одним із завдань залишається підвищення конкурентоздатності продукції тваринництва, виробленої у господарствах населення.

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