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CAN RAPESEED OIL BRING PROFIT TO UKRAINE?

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World financial crisis has found its reflection in the Ukrainian economy as well. We assume that it will be reasonable to make capital expenditures into the sphere of agriculture, metallurgy, chemical industry, engineering and energetic (only under terms of real privatization). Considering the fact of Ukraine's agricultural character of economy it is logical to make investments into the perspective sphere of agriculture – growing rapeseeds which will be able to provide not only biodiesel for our country but big profit as well. That is why the object of our research is profit that Ukraine can get in the result of growing and conversion rapeseed oil into biodiesel.

Biodiesel is defined as the alkyl monoesters of fatty acids from renewable resources, such as vegetable oils, animal fats, and waste restaurant greases. One of the attractive characteristics of biodiesel is that its use does not require any significant modifications to the diesel engine, so the engine does not have to be modificated for biodiesel. Biodiesel has a lower energy content and different physical properties than diesel fuels. These characteristics of biodiesel reduce the emissions of carbon monoxide (CO), hydrocarbon (HC), and particulate matter (PM) in the exhaust gas compared with diesel fuel.

A lot of scientists have been investigating rapeseed oil as a possibility for biodiesel. Among them we should mention Ahn E., M. Koncar, M. Mittelbach, R. Marr, M. E. Tat, J. Van Gerpen, M. Canacki, A. Monyem. As for the Ukrainian scientists who investigated the issue of biodiesel production we should name A. V. Faizova.

We think that there is certain correlation among the profit from growing rapeseed and its processing into the biodiesel, price of the rapeseed, crop capacity, sowing area, climatic conditions, quantity of mineral fertilizers, soil fertility, people's attitude towards growing and processing rapeseed, level of technical equipment, quality of technological providing. This correlation can be described by the following model:

$$Z = c_1 \cdot x_1 \cdot x_2 \cdot (1 + c_2 \cdot x_3 + c_3 \cdot x_4 + c_4 \cdot x_5 + c_5 \cdot x_6 + c_6 \cdot x_7 + c_7 \cdot x_8) \rightarrow \max$$

where Z – eventual income that Ukraine can get from growing and processing rapeseed, x1 – rapeseed capacity, x2 – sowing area of rapeseed, x3 – climatic conditions, x4 – quantity of mineral fertilizers for rapeseed growing, x5 – soil fertility, x6 – psychological attitude of people towards rapessed frowing and its processing, x7 – level of technical equipment, x8 – quality of technological providing.

Dynamics of real oil and rapeseed oil prices for the period from Sptember, 1983 till August, 2008 show that there is correlation between the oil prices and rapeseed oil prices because the rate of correlation equals 0,89. That is why in consideration of exhaustiveness rapeseed growing will be a profitable alternative for oil according to (1). In the result of lack of statistical data it is impossible to define influence of the following factors: soil fertility; people's attitude towards rapeseed growing and its processing; level of technical equipment; quality of technological providing. Consequently, (1) is transformed to the following maximization problem with some constraints:

$$Z = 260 \cdot x_1 \cdot x_2 \cdot \left(1 + \frac{x_3 - 1900}{8760} + \frac{x_4}{4,2}\right) \rightarrow \max$$

(2)
$$\begin{cases} x_1 > 20 \\ x_1 < 30 \\ x_2 > 1,7 \\ x_2 < 3 \\ x_3 > 1900 \\ x_4 > 340 \\ x_4 < 420 \\ x_1 = 1,92 \cdot e^{-0,02 \cdot (x_4 - 61)^2} \\ x_1 >= 0 \end{cases}$$

Where 260 – average market price of 1 rapeseed centner in UAH; 1900 – average quantity of sunny hours in a year in Ukraine; 8760 – number of hours in a year; 4.2 – number of mineral fertilizers for rapeseed growing in centners per hectares.

Results of the research prove that our hypothesis about profitability of rapeseed growing is true. After making calculations we have found following results: if Ukraine will be growing rapeseed on the sowing area of 1.7 million of hektars (which means that it is not necessary to extent the sowing area in comparison with 2008), with the rapeseed capacity of 20 centners from 1 hektar (which is an average indicator of 2008), with an average number of sunny hours in 1 year and with marginal maximum quantity of mineral fertilizers that are used for rapeseed growing, it will get 17,68 billion hryvnas of gross income.

According to the technologies of rapeseed processing in order to get 1 ton of biodiesel it is necessary to have 3 tons of raw materials. On the basis of optimizing model it was found out that amount of rapeseed growing will be 68 thousands of tons and the price of 1 ton of biodiesel will be $1470. Taking into account this aspect we found out that after processing rapeseed we will get 22,7 thousand of tons of biodiesel that will make it possible to earn 333, 69 millions of dollars. Presume that efficiency of rapeseed growing will be 30% and its processing into the biodiesel – 20%. In that case, net profit will be 5.3 millions of hrivnas and 66,74 millions of dollars, respectively 471,85 millions of hryvnas according to the official rate of National bank of Ukraine of 04.02.2009. That indicates that Ukraine can get almost 100 times more from growing and processing rapeseed rather that from only growing rapeseed.

This research emphasizes Ukraine's possibility to get profit from rapeseed growing and its processing. The net profit from rapeseed growing and its processing on the territory of Ukraine and exporting as biodiesel is much more bigger in comparison with the net profit of rapeseed growing and exporting as raw materials. Besides, production of biodiesel on the territory of Ukraine will provide number of additional advantages such as creation of a large number of new working places (which is necessary with the increase of unemployment), it will provide internal fuel market with biodiesel for agriculture, and what's more it will increase the level of energetic safety of our country. In the time of world financial crisis results of our research are extremely actual because they show that there is definite possibility to earn additional money for Ukraine and biodiesel production can become a strategic sphere of economy and agriculture in particular.