



Increasing Economic Efficiency of Producing Wheat in the West Siberia and South Ural as a Factor of Developing Import Substitution

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ABSTRACT

The goal of the conducted research is to define top priority areas of increasing the economic efficiency of the wheat production as a factor of developing import substitution in the cereal sector. In order to achieve the set goal, the following tasks were determined and solved: The necessity to develop import substitution in the cereal sector for separate macro-regions of the Russian Federation were analyzed; possible areas of increasing the economic efficiency of wheat production were analyzed, the potential of increasing the efficiency of wheat production on the basis of the technology intensification by using micro fertilizers was defined; and the economic effect from using micro fertilizers when producing wheat and its impact on the development of import substitution in the sector were defined. The conducted research demonstrated the economic efficiency of the development of import substitution in the cereal sector of regions of the West Siberia and South Ural on the basis of the intensification of the technology of wheat production by means of implementing new breeds of local selection and applying micro fertilizers. In spite of the fact that the obtained economic effect is predicted, these calculations are confirmed by a number of the experiments made by the authors. As a whole, they stipulate the development of the described areas of import substitution. Further researches in this area anticipate the analysis and improvement of organizational and economic issues related to increasing the efficiency in the cereal sector, including the improvement of the system related to managing business processes that take place both on the macro-economic level in the agroindustrial complex of regions and on the level of separate agricultural goods producers. Implementation of measures focused on improving the system of managing operational business processes can give a serious economic effect due to revealing and involving hidden reserves into the economic turnover.

Keywords: Import Substitution, Efficiency, Wheat Production, Micro Fertilizers, Breeds of Local Selection

JEL Classifications: Q10, Q11

1. INTRODUCTION

The cereal sector is one of the leading sectors of the agroindustrial complex. It forms the resourceful basis for the efficient development of the industrial processing of cereal and stock raising sectors. In the Russian Federation the cereal sector holds the leading role among export-focused areas of the agroindustrial complex. Annual income of the cereal exporters is about USD 3 billion. Herewith, the export potential of the sector remains rather high. In spite of this fact, in the structure of the agricultural products import

wheat has a definite share. In 2015, above 210 thousand tons of wheat for the amount of about USD 30 million were imported to the Russian Federation (Official website of the Federal Customs Service, 2016). In some cases large territory of the country and relatively weakly developed transportation infrastructure of the cereal complex contribute to the increase in the cost of the cereal produced by national goods producers of cereal. As a result, it is profitable for processors to import cereal from neighboring Commonwealth of Independent States countries than to process local raw materials.

In terms of macro-economy, it is unprofitable to use the imported raw materials for producing products of wheat processing because the funds spent by processors to buy wheat go abroad. One of the reasons why such situations occur is the low level of competitiveness of local producers of raw materials whose efficiency of operational processes considerably lags behind foreign competitors. One of the relatively accessible ways to increase competitiveness of the cereal production is the intensification of the technology based on using micro fertilizers.

Ermohin and Nekliudov (1994), Ziablov (2007), Bobrenko et al. (2011), Aristarhov et al. (2014), Medvedev et al. (2012) devoted their works to the issues related to estimating technological efficiency of using micro and macro fertilizers when producing wheat. Issues related to the economic efficiency of using fertilizers for cereals were considered in the works of Shafran et al. (2011), Shafran et al. (2015).

The efficiency of production technology does not mean that as a whole the sector works economically efficiently because in addition to technological factors, organizational and economic factors including infrastructure, the level of development of market relations and state support of the sector have an impact on the economic efficiency. Demesheva (2006), Stukach and Shumakova (2004), Shumakova (2010), Shumakova and Kryukova (2016), Shnaider and Novikov (2004) devoted their works to studying these issues in relation to the agroindustrial complex and cereal sector.

High level of the economic efficiency of the sector contributes to the increase in the competitiveness of its products as compared to the import and causes the development of import substitution. The development of import substitution in the agroindustrial complex including cereal production has its peculiarities. They were researched in works of Nardin et al. (2016), Nardin et al. (2015), Vasilieva (2015), Zakharova and Tregubova (2015), Gusakova (2014).

In spite of the wide circle of interests of researchers to the problem related to increasing the efficiency of the cereal sector and development of import substitution in it, a number of extremely important problems related to increasing the level of competitiveness of cereal remains unsolved.

The goal of this research is to define top priority areas of increasing the economic efficiency of the wheat production as a factor of developing import substitution in the cereal sector.

In order to achieve the set goal, the following tasks were determined and solved:

1. The necessity to develop import substitution in the cereal sector for separate macro-regions of the Russian Federation was stipulated
2. Possible areas of increasing the economic efficiency of wheat production were analyzed
3. The potential of increasing the efficiency of wheat production on the basis of the technology intensification by using micro fertilizers was defined, and

4. The economic effect from using micro fertilizers when producing wheat and its impact on the development of import substitution in the sector were defined.

2. METHODOLOGY

In order to stipulate the necessity to develop import substitution when producing wheat, the data of the Customs Statistics of the External Trade of the Russian Federation were analyzed (Official website of the Federal Customs Service, 2016), and the volumes of wheat import to the Russian Federation as a whole and to separate regions of the West Siberia and South Ural were defined. On the basis of the collected data, the predicted economic effect was defined. The cereal sector can get it as a result of the substitution of the import products by cereal of national producers.

The following basic areas of the increase in the economic efficiency of wheat production were defined as optimal for natural and climate and economic conditions of the economic activity in the Russian Federation as on this moment: Applying of stable highly yield breeds of the local selection, and introduction of micro fertilizers in the agricultural technology.

The potential of the increase in the efficiency of the wheat production by applying micro fertilizers was defined in the following way.

The field works were performed in 2009-2012 at the experimental field of the P. A. Stolypin Omsk State Agrarian University Federal State Budgetary Educational Institution of Higher Professional Education and the laboratory of diagnostics of plants mineral feed of the Agrochemistry Department. The location of lots at the experimental area was systematic. The area of lots was 17 square meters. The frequency of variants in the experiment was three-fold, and the location was one-tiered. The predecessor was fallow.

The objects under study included the plants of summer wheat of the duet breed (soil – meadow-chernozem, low-powered, oligohumous, heavy loamy) connected in the unified complex of agrotechnical measures and soil and climate conditions (Dosphehov, 1979). Agricultural engineering in the experiment was the one that is generally accepted for the West Siberia and South Ural: In autumn basic processing – autumn plowing with a plough at the depth of 20-22 cm. Secondary tillage was in early spring harrowing with tooth harrows in two tracks for the soil to achieve the state of physical maturity and pre-plant cultivation at the depth of seeds covering. Fertilizers were put manually at the depth of 8-10 cm, in two sides of the row at the distance of 10 cm. Forms of fertilizers were double superphosphates (P_2O_5 – 45%) and ammonium saltpeter (34%). The following fertilizers were used for powdering: Potassium chloride (K_2O – 54%), zink sulfate (Zn – 22%), copper sulfate (Cu – 25.5%) and manganic sulfate (Mn – 22.8%).

Before sowing, seeds were powdered with micro-elements. Before and after sowing, compacting with robbed rollers took place. The standard of seeding was 5.5 million of fertile seeds per hectare, at the depth of 5-6 cm. harvesting was performed by continuously

throughout by leaving crop remains on the field surface. The yield was accounted at the stage of gold ripeness. During the vegetation in the experimental field the growth and development of plants were observed (Litvak, 1990).

Laboratory researches took place at the Agrochemistry Department and in the laboratory of diagnostics of plants mineral feed of the Agrochemistry Department of the P. A. Stolypin Omsk State Agrarian University Federal State Budgetary Educational Institution of Higher Professional Education. For the purpose of comprehensive accounting of basic factors of forming yield and quality of the wheat, soil diagnostics of the mineral feed of the crop was carried out.

The results of the field and laboratory researches were mathematically and statistically processed by methods of the dispersive, correlation, and regressive analysis by using methods of multi-factorial mathematic modeling and relevant applied software (Kidin et al., 2008; Ermohin and Nekliudov, 1994).

Economic effect from using micro fertilizers was defined taking into account the raise of the yield and expenses of goods producers for obtaining additional products.

3. RESULTS

3.1. Analysis of Importing Wheat to the Russian Federation

Table 1 shows the data that characterizes the import of wheat to the Russian Federation in 2014 – quarter I of 2016 (Official website of the Federal Customs Service, 2016).

The analysis of the data from Table 1 showed that the total volume of wheat import to the Russian Federation for the research period was above 400 thousand tons. Herewith, the import cost exceeded USD 63 million. In rubles equivalent it was RUB 3.3 billion. The data from the table also specifies a gradual growth of the wheat import volumes: In 2105 as to 2014 the volume of natural import increased by 67% and exceeded 210 thousand tons. For the first quarter of 2016 the volume of wheat import exceeded the half of all import of 2016 and made up above 30% of the annual volume of 2015. The increase in the wheat import is stipulated by the low level of competitiveness of national cereal sector, because for many processing enterprises located in boundary regions it was cheaper to purchase wheat for processing from abroad than to use local raw materials at the specified period. In terms of macro economy this situation must be considered as negative because during the period from 2014 till quarter I of 2016 the cereal sector of importer regions lost above RUB 3 billion that could be invested in the

sector development. This problem is especially vexed in regions of the West Siberia and South Ural where the natural wheat import is 42% and above 50% in relation to cost import (Official website of the Federal Customs Service, 2016) (Table 2).

In 2014-2015 a differential characteristic of the wheat import to regions of the West Siberia and South Ural is a high price of 1 ton of import as compared to the average price in Russia: By 11.2% in 2014, and by 5.2% in 2015. In quarter I of 2016 the price of 1 ton of wheat import to regions of the West Siberia and South Ural was almost equal to the price of 1 ton of import on average in Russia.

Thus, the wheat import substitution in regions of the West Siberia and South Ural will allow to annually direct RUB 700-800 million to the cereal sector. It will have a positive impact on the economic position of both separate agricultural producers and the sector position as a whole.

The development of import substitution in the cereal sector is possible only due to the increase in the level of competitiveness of the produced products on the basis of increasing technological and economic efficiency of cereal production. It is possible to single out the basic areas of increasing the efficiency of the cereal sector:

1. Technical re-equipment of the sector, use of new technology and equipment within applying traditional production technologies
2. Implementation of innovational technologies of wheat growing with simultaneous renewal of machines and equipment park
3. Intensification of the existing production technologies by using the formed machines and equipment park, and
4. Implementation of the adapted highly productive breeds of the local selection that are resistant to the impact of diseases and varmint.

The third and the fourth areas of increasing the efficiency of cereal production are the least cost-intensive in terms of economy. Within this research the efficiency of intensifying the technology of wheat growth based on applying micro fertilizers for a new breed of the local selection will be estimated.

3.2. Increasing Efficiency of Producing Wheat in Regions of the West Siberia and South Ural by Using Micro Fertilizers

According to the results of crop variety testing on the selection areas of the Omsk State Agrarian University, one of the prospective breeds of wheat meant for cultivating in regions of the West Siberia and South Ural is Duet breed of the summer soft wheat (Krasnova, 2016).

Table 1: Import of wheat in the Russian Federation in 2014 – 1st quarter of 2016

Indicator	2014	2015	Quarter 1 2016
Import volume, tons	125,696.6	210,158.6	66,178.9
Import cost, USD thousand	27,407.4	28,087.6	7,909.8
Price of 1 ton of import, USD	218.0	133.6	119.5
USD rate*	37.81	60.6	72.95
Import cost, USD thousand	1,036,273.8	1,702,108.6	577,019.9
Price of 1 ton of import, USD	8244.2	8099.2	8719.1

*According to data from the official website of the Central Bank of the Russian Federation, 2016

Table 3 shows the results of experiments on using micro fertilizers for wheat plantings of this breed in accordance with the methodology described above.

According to the data from Table 3, the maximum yield of the first class of the duet cereal is provided for by using zink sulfate (22%), copper sulfate (25.5%), and manganic sulfate (22.8%) dozed at 121 g/1 ha. The average growth of the yield as compared to the testing sowing without fertilizers was 10.4 dt/ha. The average growth according to the ground without fertilizers was 7.4 dt/ha. The maximum yield of the highest class of Duet cereal was achieved when using zink sulfate (22%) dozed at 363 g/1 ha, copper sulfate (25.5%), and manganic sulfate (22.8%) dozed at 121 g/1 ha. The growth of the yield made up 9.6 dt/ha, the average growth according to the ground without fertilizers was 6.6 dt/ha. The price of fertilizers in both cases does not surpass RUB 200. These are inconsiderable expenses taking into account the size of the yield growth.

Thus, the use of fertilizers showed its efficiency in the experiments. It allows to make the conclusion about the possibility to increase efficiency of the cereal sector by intensifying the applied technologies of cereal production. Herewith, it is necessary to take into account that in the above experiment micro fertilizers were used on the optimal agricultural

ground. Its creation from scratch on farms requires considerable expenses (about RUB 20 thousand per 1 ha). These expenses are economically viable under the average yield of 30 dt/ha and high class of cereal, because in 2105 the average price of 1 ton of the highest class wheat in regions of the West Siberia and South Ural exceeded RUB 11 thousand/1 ton (Expert and Analytical Center of Agricultural Business, 2016). One more peculiarity of the Duet breed is its high yield. It was demonstrated in experiments of the variety test plot of the P. A. Stolypin Omsk State Agrarian University Federal State Budgetary Educational Institution of Higher Professional Education within comparing various breeds of the local selection (Krasnova, 2016) without using fertilizers. According to the data of 2012-2014 the average yield was about 25 dt/ha. It surpasses the yield obtained on the optimal agricultural ground by 11%. Such difference is stipulated by the difference of natural and climate conditions according to the years of experiments, because duet breed has a high level of plasticity and is much responsive to the intensification of agricultural technology. It allows to get the yield of up to 30 dt/ha when using micro fertilizers.

The use of duet breed in combination with the intensive technology of production will allow to considerably increase the efficiency of the cereal sector in regions of the West Siberia and South Ural. It will have a positive impact on the competitiveness of cereal and allow to drive foreign goods producers out of a market.

Table 2: Import of wheat to regions of the West Siberia and South Ural in 2014 – 1st quarter of 2016

Indicator	2014	2015	Quarter 1 of 2016
Import volume, tons	86,011.3	79,061.0	5,566.0
Import cost, USD thousand	20,860.0	11,120.0	664.3
Price of 1 ton of import, USD	242.5	140.7	119.3
USD rate*	37.81	60.6	72.95
Import cost, USD thousand	788,716.6	673,872.0	48,460.7
Price of 1 ton of import, USD	9169.9	8523.4	8706.6

*According to data from the official website of the Central Bank of the Russian Federation, 2016

3.3. Impact of Intensification of Wheat Production Technology on Import Substitution in Regions of the West Siberia and South Ural

Table 4 shows the data that characterize the economic efficiency of using micro fertilizers and impact of the intensification of the technology of wheat production on the development of import substitution in regions of the West Siberia and South Ural. The table uses the data from the Official website of the Federal Customs Service of the Russian Federation (2016) and results of the authors' experiments.

Table 3: Results of experiments on using micro fertilizers for sowing of duet wheat*

Type of fertilizers	Seeding standard per 100 ha, dt	Mass of 1000 seeds, g	Yield t/ha	Cereal class	
Control without fertilizers		242	41	1.96	First
Ground (N60P60K60)		242	43.5	2.26	First
Ground+Zn50		242	37.7	2.46	Highest
Ground+Zn100		242	45.2	2.46	Highest
Ground+Zn150		242	39.7	2.82	Highest
Ground+Cu50		242	38.5	2.56	Highest
Ground+Cu100		242	38.4	2.7	Highest
Ground+Cu150		242	39.5	2.56	Highest
Ground+Mn50		242	43.3	2.61	Highest
Ground+Mn100		242	43.8	2.63	Highest
Ground+Mn150		242	38.5	2.62	Highest
Ground+Zn50+Cu50		242	43	2.51	First
Ground+Zn50+Mn50		242	40.5	2.37	First
Ground+Cu50+Mn50		242	38.4	2.84	First
Ground+Zn50+Cu50+Mn50		242	38.3	3.00	First
Ground+Zn150+Cu50+Mn50		242	42.3	2.92	Highest
Ground+Zn50+Cu100+Mn50		242	39.5	2.30	First
Ground+Zn50+Cu50+Mn100		242	41.8	2.70	First
Ground+Zn150+Cu100+Mn100		242	40.1	2.65	First

*According to the results of the authors' researches

Table 4: Prospects of import substitution of wheat in regions of West Siberia and South Ural due to intensification of production technology

Indicator	2014	2015	Quarter I of 2016
Import volume, tons	86,011.3	79,061.0	5566.0
Import cost, RUB thousand	788,716.6	673,872.0	48,460.7
Price of 1 ton of import, RUB	9169.9	8523.4	8706.6
Average price of 1 ton of cereal of the first class produced in regions of the West Siberia and South Ural according to data of 2015, RUB	11,000.0	11,000.0	11,000.0
Average yield of wheat in regions of the West Siberia and South Ural, t/ha	1.4	1.4	1.4
Average profit from 1 ha of agricultural goods producers of the West Siberia and South Ural, RUB	15,400.0	15,400.0	15,400.0
Average yield of wheat in regions of the West Siberia and South Ural (intensive technology duet breed with micro fertilizers), t/ha	3.0	3.0	3.0
Price of 1 ton of wheat produced according to the intensive technology that provides the maintenance of the profit and average profitability of the cereal sector (30%) on the level of the traditional technology, RUB	8000.0	8000.0	8000.0
Total amount of expenses when substituting the purchase of the imported wheat by the wheat produced according to the intensive technology, thousand RUB	688,090.4	632,488.0	44,528.0
Economy of expenses when purchasing wheat produced according to the intensive technology as compared to the purchase of the imported wheat, thousand RUB	100,626.2	41,384.0	3,932.7

When calculating the target effect from the development of import substitution in the cereal sector of regions of the West Siberia and South Ural, the following assumptions were made:

1. The average price of 1 ton of wheat of the first class in the above regions was taken on the level of 2015 – RUB 11 thousand
2. According to the data of 2015 the actual average yield of wheat in regions of the West Siberia and South Ural was from 13 to 16 dt/ha. The yield of 14 dt/ha was used for calculating (Official website of the Federal Service of State Statistics of the Russian Federation, 2016), and
3. In 2015 the average profitability of the cereal sector in regions of the West Siberia and South Ural was more than 30%; this level was included in the calculation for the whole period.

The calculations from Table 4 were made taking into account the above restrictions point at the economic reasonability to intensify the wheat production in terms of developing import substitution. The cereal buyers' expenses when purchasing national wheat are lower than the expenses for buying the imported cereal by 6-12%. Herewith, the profitability of the cereal sector (profits of agricultural goods producers) in regions of the West Siberia and South Ural will remain on the same level. It is ensured by the growth of the wheat yield. The total amount of the expenses economy due to the development of import substitution in the sector on the basis of intensifying the production technology for cereal buyers for the researched period could be about RUB 150 million.

The predicted macroeconomic effect from developing import substitution in the cereal sector of the above regions for the period from 2014 to quarter I of 2016 was about RUB 1.4 billion. These are the funds that could be used for developing the cereal sector of Russia instead of sending them abroad.

4. DISCUSSION

The conducted researches showed economic efficiency of the development of import substitution in the cereal sector

of regions of the West Siberia and South Ural on the basis of the intensification of the technology of wheat production by means of implementing new breeds of local selection and applying micro fertilizers. In spite of the fact that the obtained economic effect is predicted, these calculations are confirmed by a number of the experiments made by the authors. As a whole, they stipulate the development of the described areas of import substitution.

Herewith, it is necessary to take into account that the offered breed duet has a high level of flexibility. It says about the increased requirements to the quality of the production technology. Worsening of technological parameters of production may considerably decrease the efficiency of duet wheat production. That is why the implementation of the offered areas of wheat import substitution in the above regions can be interesting in terms of economy for agricultural organizations that have a high culture of agriculture and is focused on innovational development of the sector. Within technology intensification, the agricultural organizations that do not have an opportunity to provide a high level of agricultural technology when producing wheat due to weakly predictable natural and climate conditions of production or as a result of unstable financial position can use other prospective breeds of local selection, including "OmGAU 90." This breed has a high coefficient of stability and inconsiderably reacts to changes of the production conditions, and herewith it displays the average yield of 2.5 t/ha (Krasnova, 2016).

5. CONCLUSION

Within the conducted research on increasing the economic efficiency of wheat production and development of import substitution in the cereal sector of regions of the West Siberia and South Ural based on it, technical and technological issues of increasing the production efficiency were considered and the economic estimation of the offered measures was made. The offers on intensifying the technology of wheat production were economically stipulated.

Factors that can have a considerable impact on the efficiency of taking the offered measures were shown.

Further researches in this area anticipate the analysis and improvement of organizational and economic issues related to increasing the efficiency in the cereal sector, including the improvement of the system related to managing business processes that take place both on the macro-economic level in the agroindustrial complex of regions and on the level of separate agricultural goods producers. The implementation of measures focused on improving the system of managing operational business processes can give a serious economic effect due to revealing and involving of hidden reserves in the economic turnover.

Issues related to import substitution of agricultural products in the Russian Federation have remained especially urgent over recent years due to the current external political situation and will take the center stage for quite a long period of time. It requires to newly re-consider the system of import substitution that is in the country due to the constantly changing conditions. That is why the research work in this area will be continued.

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