Economic indicators characterizing the carrot import substitution in the Russian Federation

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Abstract. The comparative analysis of changes in prices for carrots with changes in prices for fruit and vegetable products and the level of inflation is given. The analysis of the structure of imports of carrots by countries is given, and the countries that have completely stopped purchasing carrots are listed. Its consumption has not reached the rational consumption standards recommended by the Ministry of Healthcare of the Russian Federation yet, which are 17 kg per year for 1 person. Reduced supplies from foreign countries allowed national vegetable producers to increase the production of carrots. Production of carrots in Russia remains profitable even without subsidies. However, the achieved profitability does not allow for extended reproduction. The average Russian consumer prices for carrots for the months of 2018 were in the range of 27.73...54.56 rubles/kg.

1. Introduction
In August 2014, a new impetus to the development of import substitution in the agro-industrial complex was given by the embargo on the import of a number of agricultural products and food. [1].

In the agro-industrial complex, a special plan to promote import substitution was approved earlier than in other sectors of the economy. For this purpose, the State program for the period up to 2020 was corrected. Additional funds were allocated from the Federal budget to support the State Program. In order to stimulate the growth of agricultural production and increase the rate of import substitution, new forms and mechanisms of budget support for the industry were introduced [2].

Competitiveness is one of the most important integral characteristics used to evaluate economic efficiency. It is a complicated complex concept that includes a large number of significantly different objects. In this regard, there is no generally accepted definition of this category in the economic literature, which would include all its aspects [3].

In the current external economic conditions, self-sufficiency in food remains a priority [4]. The volume of vegetable production in the last 6-7 years has stabilized and is slightly more than 16 million tons and along with imports, it mostly covers the needs of the population. However, the product range is very narrow, 2/3 of the gross output is provided by 5-6 crops, out of more than 100 cultivated species [5]. The sanctions have given us the opportunity to replace a quality imported product with a national one, and we should take this advantage [6].

In the new version of the State Program (ed. from 31.03.2017 №396), it is planned to increase the supply of national seeds by at least 75% by 2020 [7].

One of the fundamental factors determining the competitiveness of products is the level of net cost of production [8].
Depending on the level of net cost, the producer price is formed, which is the next important characteristic of the competitiveness of agrifood products [9]. The maximum decrease was observed for potatoes – by 41%, tomatoes and barley – by 34%, carrots – by 32%, wheat – by 29%. Also, a significant decrease in the net cost of production was noted for onions – by 28%, cabbage – by 20%, sunflower oil – by 15% [10].

2. Materials and methods
When analyzing the economic indicator that characterizes the import substitution of carrots in the Russian Federation, the following methods were used: economic and statistical, methods of system and comparative analysis, mathematical modeling and planning [11, 12]. The study is based on the collection and analysis of information and statistics from Gosstat, the international organization of FAO – the Food and Agriculture Organization of the United Nations, which has reliable information in the field of world objects of production of various types of food.

3. Results
Carrots occupy about 70,000 ha in the Russian Federation, including 30,000 ha in commercial farms [13]. Most of this area is represented by foreign hybrids of companies: “Bayo” (F1 Cascade, F1 Nandrin, F1 Canada, F1 Baltimore), “Monsanto” (F1 Abaco), “Raiktsvaan” (F1 Fidra, F1 Morelia).

US and EU sanctions, as well as the Russian President Vladimir Putin’s response to their embargo on the supply of imported food, put forward the need for import substitution and the restoration of domestic production of products as a priority [14].

Today, in addition to state research institutes, originators of varieties are officially many seed-growing agricultural enterprises and private individuals. In Russia, both a state research institute: Federal Scientific Center of Vegetable Growing (FSCVG), as well as private companies: Agricultural holding “Search”, LLC “Breeding station named after N.N. Timofeev”, etc. are most productively engaged in carrot breeding and seed production. So, FSCVG has a whole line of carrot hybrids that meet the modern requirements of commercial production: F1 Altair, F1 Tavrida, F1 Krasnogorye, the Corsair variety, joint selection with the Agricultural holding “Search” hybrid carrots F1 Baby. This hybrid of carrots in 2017-2018 passed production tests in the largest vegetable-growing commodity farm of CJSC “Kulikovo” (Dmitrov district of the Moscow region) on an area of 10 hectares. The commercial yield is 53-71.7 t/ha. The yield of commercial products is 85-90% [15].

In 2017-2018, the hybrid F1 Tavrida and the Corsair variety were tested at ARRIVG and at the Biryuchekutskaya VBES, the density of plants in two geographical locations was 0.9-1.0 million PCs/ha. The yield of F1 Tavrida in 2017 is 64.1, and in 2018 - 58.0 t/ha. The Corsair variety in 2017 – 63.1, and in 2018 - 60.1 t/ha. The yield of commercial products is from 70.1 to 78.9% [16]. The average Russian yield of carrots in 2017 was 41.1 t/ha. The maximum yield was obtained in the North Caucasus district - 64.5 t/ha. Among vegetable producers, we note the agricultural firm “Komsomolskiye vegetables” (Komsomolsky district of Chuvashia), which received 95 t/ha of carrots [17]. The gross yield of carrots has increased more than 3 times in 27 years [18].

Thus, by creating new national varieties and hybrids of carrots with a relatively high yield and marketability, thereby restoring national production, it is possible to increase the capacity of the commodity market.

Let us look at the state of the vegetable market in 2013-2018 in order to analyze objectively the effect of import substitution.

After the introduction of anti-sanctions and setting the goal of import substitution, as well as changing the mechanism of exchange rate policy of the Central Bank of the Russian Federation, prices began to rise sharply at the end of 2014. In February 2015, prices for fruit and vegetable products were higher than prices a year earlier by 43.5 %, and for carrots by 38.0...40.7 % with inflation of 16.7 %. The maximum increase in prices for carrots relative to the month of the previous year was in July and amounted to 69.1...77.9 %, while in general, prices for fruit and vegetable products increased relative to July last year by 27.9 %, and inflation was 15.6 %. (table 1)
In 2017, the first stage of work is successfully completed after the introduction of the inflation targeting regime in 2015. At this stage, the Bank of Russia has gradually reduced inflation from high double-digit rates to 4% in 2017 over two years [20].

In 2018, the growth rate of prices for fruit and vegetable products decreased. So, the maximum indicator was 6.4 % (in March), and the maximum price decrease relative to the month of the previous year was in June – by 9.8 %. For carrots in 2018, the price did not decrease, including due to the fact that it was adjusted in 2016 – the price decrease in the week to the week of 2015 was from 12.5 to 35.1 %.

The increase in prices for vegetable producers in relative values occurred within the same limits (table 2), but the difference between consumer prices and producer prices in absolute terms is from 2 to 4 times. Thus, the share of vegetable producers in the consumer price of beets and/or carrots is 25…50%.

According to representatives of retailers who speak at Parliamentary hearings, the markup on vegetables covers only the costs of transportation, storage and sale, that is, the net margin from sales by large retail chains is 0 %. In this situation, it is necessary to establish a cycle of direct deliveries of vegetables to distribution points under conditions that are suitable for all vegetable producers, in order to avoid all losses at the logistics stage.

Table 2. Average sales prices of beet and carrot for all categories of agricultural producers, from 2002 to 2016, rubles/t.

| Quarters | 2013  | 2014  | 2015  | 2016  | 2017  | 2018  |
|----------|-------|-------|-------|-------|-------|-------|
| I quarter| 9913.91 | 12722.5 | 17832.4 | 13906.77 | 11209.88 | 11315.16 |
| II quarter| 12101.15 | 13722.39 | 17858.46 | 16150.94 | 13394.16 | 12469.92 |
| III quarter| 11792.79 | 12682.12 | 14266.83 | 15780.17 | 12114.99 | 15161.74 |
| IV quarter| 14312.89 | 13998.82 | 14003.78 | 13461.63 | 11512.94 | 12131.38 |

The lack of carrots is partially compensated by imported supplies. Analysis of imports of carrots and turnips showed that in 2014-2016, its volume in physical terms decreased by 41.4 % compared to 2013 (table 3).
Table 3. Import of carrot and turnip.

| Year | Import volume | Change in import volume to the previous year, % |
|------|---------------|-----------------------------------------------|
|      | in US dollars | in kg                                          | in US dollars | in kg |
| 2013 | 126 539 868   | 257 709 070                                   | -             | -    |
| 2014 | 116408 530    | 245004392                                     | -8            | -5   |
| 2015 | 80 398 255    | 176120946                                     | -31           | -28  |
| 2016 | 61553 576     | 151022916                                     | -23           | -14  |
| 2017 | 76 232 721    | 186083936                                     | 24            | 23   |
| 2018 | 76385 431     | 179648 885                                    | 0             | -3   |

The lack of carrots is partially compensated by imported supplies. Analysis of imports of carrots and turnips showed that in 2014-2016, its volume in physical terms decreased by 41.4 % compared to 2013 (table 4). The structure of imports by countries changed significantly. If in 2013 the largest share of imports in physical terms was accounted for by Israel (41 %), in 2018 – by the Republic of Belarus (29%). Purchases from the following countries were completely stopped: Belgium, the Netherlands, Poland, Lithuania, Ukraine, France, and Italy. They accounted for 30 % of deliveries.

Despite a significant reduction in imports, the consumption of root crops per 1 person on average in 2016-2017 increased by 8 % compared to 2013-2015, although it has not reached the rational norms of food consumption recommended by the Ministry of Healthcare of the Russian Federation that meet modern requirements of healthy nutrition yet, which are 17 kg/year/person.

The decrease in supplies from foreign countries allowed domestic agricultural producers to increase production. In 2015-2016, the volume of imports in physical terms decreased by 38.4 % compared to 2014. The gross carrot harvest increased by 11 % during this period. Thus, with an increase in consumption, the share of imported products decreased from 15.8 % to 9.4 %.

4. Summary

This paper analyzes the carrot market. Carrot prices were compared with changes in prices for fruit and vegetable products, as well as with annual inflation, which allows assessing objectively the changes occurring in the Russian consumer market before the introduction of response measures by Russia and after. Despite the combination of negative factors that peaked in 2015, in 2016 prices partially recovered to the level of 2014, and in the future their growth was mainly due to inflation. Taking into account the seasonal nature of carrot production, consumer prices are shown by week. Consumer prices peak in mid-summer and in some years are several times higher than their minimum value. The multiple excess of consumer prices over producer prices indicates an inefficient logistics system. In general, based on the analysis, we can speak of a satisfactory result of the measures taken aimed at import substitution of carrots: consumption increased with a decrease in the share of imported products, and the growth of consumer prices during the study period was at the level of inflation.

5. References

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