Analysis of the world lettuce market

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Abstract. The article presents an analysis of the lettuce market (Lactuca sativa L.) as one of the most economically important leafy vegetable crops in the world and the Russian Federation. In human nutrition, the value of lettuce is determined by those properties that are recognized as health-improving due to the high content of vitamin C, polyphenols, and fiber. The paper reviews the effect of lettuce in the prevention of cardiovascular disease. It also shows the production performance of world lettuce production, including information about countries that have a significant share in global production. The authors consider the interstate exchange of lettuce products, indicating the volume of exports and imports in value and volume terms. The leading countries with the maximum indicators of import and export in value terms are identified, and the maximum and minimum prices of purchase and sale among them for the period under review are indicated. Separately, imports and exports of lettuce in the Eurasian Economic Union are analyzed, indicating the States to which the countries of the Union export, as well as the share of each member country in exports and imports. A detailed analysis of Russia’s imports and exports, with allocation of the Federal districts having the greatest share, is carried out, and also the main directions with indication of the region of the country are discussed.

1. Introduction

The lettuce (Lactuca sativa L.) is one of the most economically important leafy vegetable crops in the world [1], [2]. The healing properties of lettuce are determined by a high content of antioxidant compounds, primarily vitamin C and polyphenols, as well as fiber [3]. Recent studies on rats and humans have demonstrated the health effects of lettuce in the prevention of cardiovascular diseases [4].

Several morphotypes of lettuce are grown in production, but the most common are romaine lettuce, leafy, headed crispy, and oily ones. Growing morphotypes and varieties of lettuce depend on both market strategies and commercial requirements [5], [6].

2. Materials and Method

In the framework of the general systems approach to the study of the problem, the tools of abstract logical, comparative, economic-statistical, economic-mathematical, and computational-constructive research methods are used. The informational basis of the research includes legislative and regulatory documents of state authorities, methodological and guidance materials of the Ministry of Agriculture of the Russian Federation. The empirical base of the research is presented by the materials of the Federal State Statistics Service of the Russian Federation, the Ministry of Economic Development of...
the Russian Federation, and other ministries and departments, as well as the following: Federal Customs Service of the Russian Federation, EurAsEC Customs Union, Organization for Economic Cooperation and Development, World Trade Organization, Statistical Agency of the European Union.

3. Results and Discussion

According to the FAO, in 2017, lettuce was produced in 106 countries. We present the production indicators of countries whose share in the global gross yield is more than 1% (Table 1).

| Country     | Sown area, ha | Productivity, t / ha | Gross yield, t |
|-------------|---------------|----------------------|---------------|
| Total       | 1203677       | 122735               | 260329        |
| including   | 8             | 3                    | 7             |
| China       | 618279        | 632972               | 1458374       |
| India       | 170397        | 171884               | 1084850       |
| USA         | 105660        | 111900               | 3795480       |
| Spain       | 34314         | 34508                | 927378        |
| Italy       | 31329         | 34069                | 626525        |
| Turkey      | 21099         | 22889                | 447492        |
| Japan       | 21500         | 21048                | 568000        |
| Mexico      | 20289         | 21030                | 437562        |
| Germany     | 14150         | 15096                | 343083        |

The biggest share of the gross yield and area under crop (75%) is in China, India, and the USA. More than half of the global acreage falls on China (51.6%). During the study period, the country has seen an increase of 1...2% annually. In total, 14% of the sown area is accounted for by India, it is 9.1% in the USA.

The gross yield of lettuce in China is greater than that of all other countries combined, its share in the global harvest is 56.4%. The second place is occupied by the United States (14.3%), which is due to the low (3.5 times less than the world average) yield in India, the share of which was 4.1%.

Due to the unevenness of production across countries, the surplus of grown products is exported. Thus, Spain (which has a double separation from the United States in quantitative terms) continues to increase its exports (Table 2).

| Country     | Amount, kg | Cost, USD | Amount, kg | Cost, USD | Amount, kg | Cost, USD |
|-------------|------------|-----------|------------|-----------|------------|-----------|
| Spain       | 723847640  | 69968612  | 743130750  | 726966041 | 761902481 | 747555634 |
| USA         | 336642960  | 527292672 | 335278042  | 469441803 | 331443417 | 508124108 |
| Italy       | 74186039   | 153865332 | 77935554   | 150195842 | 73356138 | 167226125 |
| Netherlands | 96296885   | 150300088 | 94664196   | 150599310 | 105237386 | 193136857 |
| Mexico      | 153030414  | 137906142 | 161658497  | 153308373 | 213993557 | 229969746 |
| Belgium     | 40687673   | 61784044  | 39335961   | 58896066 | 39603357 | 60908452 |
| China       | 91068678   | 46941834  | 115304202  | 81152450 | 9570289 | 85963701 |
| Canada      | 42277278   | 46734367  | 39773112   | 41445012 | 39019670 | 43515950 |
| Germany     | 43650139   | 46314934  | 36561685   | 38715797 | 40406537 | 47012737 |
| France      | 21547278   | 35241210  | 21721083   | 34523972 | 21579211 | 42026682 |

A composition of the top ten countries with the maximum export in value terms did not change from year to year for the period under consideration. The minimum average selling price (0.52...0.90 USD / kg) was in China, and Italy sold the most expensive products among the countries surveyed (1.93...2.28 USD / kg).
The countries compensate for the lack of own production by purchasing imported products. Table 3 lists the countries that were in the top ten in terms of imports from 2015 to 2017. Canada is the leader, but there are quantitatively incomplete data in 2017, because Canada does not provided accurate information for all types of salads imported into the country.

Table 3. The volume of imports of lettuce in the natural and value indicator of the main importing countries.

| Country          | 2015   | 2016   | 2017   |
|------------------|--------|--------|--------|
|                  | Amount, kg | Cost, USD | Amount, kg | Cost, USD | Amount, kg | Cost, USD |
| Canada           | 282342477 | 440768576 | 279010361 | 386011309 | 8749608 | 425342615 |
| Germany          | 262202231 | 370888569 | 248326738 | 361419634 | 244957517 | 39760264 |
| USA              | 224182722 | 269457076 | 218349185 | 210391414 | 184392220 | 302882715 |
| United Kingdom   | 207450833 | 236805444 | 221408467 | 225809881 | 192632853 | 213117184 |
| France           | 85402333  | 101991097 | 90140487  | 108357813 | 83857577 | 109023035 |
| Netherlands      | 67897024  | 96691478  | 69729155  | 101201748 | 87183677 | 72967335 |
| Italy            | 83404444  | 71979732  | 60812931  | 88718877  | 127018509 | 56086774 |
| Poland           | 48597471  | 57639221  | 45838145  | 87183677  | 72967335 | 53971666 |
| Sweden           | 37157653  | 55265169  | 43261438  | 48767601  | 35410549 | 52791112 |
| Belgium          | 27561426  | 50739732  | 29256420  | 53686244  | 24345073 | 46113532 |
| Austria          | 27440779  | 497151442 | 27066854  | 49436887  | 24337131 | 53971666 |

Among the countries considered, the minimum average purchase price was in Italy (0.72 ... 0.86 US dollars / kg), the maximum one was in Belgium and Austria (1.81 ... 2.17 US dollars / kg).

We will consider the top five countries of the Eurasian Economic Union (Table 4).

Table 4. The volume of exports and imports of lettuce in the EurAsEC countries.

| Country          | 2015   | 2016   | 2017   | 2018   |
|------------------|--------|--------|--------|--------|
|                  | Amount, kg | Cost, USD | Amount, kg | Cost, USD | Amount, kg | Cost, USD | Amount, kg | Cost, USD |
| EurAsEC (export) | 54942  | 35982  | 38352  | 26284  | 45337  | 37628  | 88648  | 55419  |
| EurAsEC (import) | 31576467 | 31142923 | 33143739 | 31989970 | 40565118 | 37040116 | 45180243 | 40995035 |

Country share in value EAEU - total, %

| Country | export | import | export | import | export | import | export | import |
|---------|--------|--------|--------|--------|--------|--------|--------|--------|
| Armenia | 2.3    | 0.0    | -      | 0.0    | -      | 0.0    | 0.0    | 0.0 |
| Belarus | 10.5   | 59.0   | 26.7   | 47.6   | -      | 35.7   | 12.5   | 27.6 |
| Kazakhstan | -    | 2.2    | -      | 1.7    | -      | 1.8    | -      | 1.8 |
| Kyrgyzstan | -    | 0.0    | -      | 0.0    | -      | 0.0    | -      | 0.0 |
| Russia  | 87.2   | 38.8   | 73.3   | 50.7   | 100.0  | 62.5   | 87.5   | 70.6 |

The EurAsEC countries export lettuce to Belgium, Georgia, China, Lithuania, Morocco, Norway, Uzbekistan, and Ukraine. Most exports come from Russia to Ukraine.

The excess of imports over exports to the Union countries is a hundred times. More than half comes from imports to Russia. During the study period, Morocco, China, Iran were the leading countries in the supply of lettuce to the Union in different years.

According to the Customs Service, in 2016-2018, Russia exported lettuce to Belarus, China, Kazakhstan, Norway and Ukraine.

The main share of exports falls on the Central Federal District, and the North Caucasus, on the contrary, does not participate in exports of salads during the study period (Table 5).
Table 5. Lettuce export from Russia.

| Federal districts | 2016       | 2017       | 2018       |
|-------------------|------------|------------|------------|
|                   | Cost, USD  | Amount, kg | Cost, USD  | Amount, kg | Cost, USD  | Amount, kg |
| Russia            | 522816.1   | 137333.4   | 168088     | 79632.1    | 253727.2   | 152351.1   |
| Central           | 504009.4   | 133252.4   | 130447     | 34295      | 201744.9   | 72147      |
| Northwestern      | 620.1      | 75         | 60         | 145        | 3535.7     | 802        |
| Southern          | 18032.1    | 23836.0    | 37571      | 45192      | 48211.4    | 79110.5    |
| Volga             | 44.2       | 40         | -          | -          | -          | -          |
| Ural              | -          | -          | 10         | 0.1        | -          | -          |
| Siberian          | 110.3      | 130        | -          | -          | 2.4        | 0.6        |
| Far Eastern       | -          | -          | -          | -          | 232.8      | 291        |
| North Caucasus    | -          | -          | -          | -          | -          | -          |

The sale of lettuce to Belarus brings in more than half of the revenue, namely, $527,209.3. The Moscow and Smolensk regions of the Central Federal District and St. Petersburg of the North-West Federal District export to Belarus. Exports to Kazakhstan amounted to $312,694.6 and was mainly from Moscow. The Omsk, Orenburg, and Tyumen regions supplied an insignificant part (less than 2 centners of products). The Southern Federal District (from the Krasnodar, Astrakhan and Rostov regions) almost fully delivered to Ukraine in the amount of $103,874.5.

The main problem for the production of lettuce in Russia is the climatic conditions. There is no opportunity to harvest year-round in the open field. Imports to Russia increased both in value and volume terms (Table 6). The main consumers are the fast food businesses. Moreover, in Russia, the market for washed and sliced lettuce is developing at a fast pace, where the assortment includes Salanova® varieties, baby-lettuce and variety types with the Knox™ attribute.

Table 6. Lettuce imports to Russia.

| Federal districts | 2016       | 2017       | 2018       |
|-------------------|------------|------------|------------|
|                   | Cost, USD  | Amount, kg | Cost, USD  | Amount, kg | Cost, USD  | Amount, kg |
| Russia            | 18651346.8 | 27812250.8 | 25431731.8 | 36538435.8 | 31248931.8 | 41125871.7 |
| Central           | 13214934.7 | 21711105.1 | 17553053.4 | 27671062.7 | 23045577   | 31193925   |
| Northwestern      | 288727.1   | 260468.8   | 971400.4   | 962790.7   | 1261015.3  | 1477765.5  |
| Southern          | 1116201.5  | 1093517.3  | 1759463.6  | 1825016.4  | 1480156.4  | 1704345    |
| Volga             | 1265404.5  | 1252757.9  | 1625545.1  | 1659263    | 1268518.3  | 1157178    |
| Ural              | 133.5      | 205        | 74829.2    | 88002      | 206055.1   | 240741     |
| Siberian          | 814649.1   | 1005649.6  | 988924.8   | 1228748.4  | 839446.6   | 1034638.9  |
| Far Eastern       | 1940301.9  | 2477160.6  | 2386104    | 3014932.6  | 3134842.1  | 4301899.5  |
| North Caucasus    | 10994.5    | 11386.5    | 72411.3    | 88620      | 13321.4    | 15378.8    |

Deliveries to the Central Federal District account for about 70%. In 2016-2017, more than half of deliveries to the Central District accounted for the Moscow region, mainly (> 75%) from Iran, Tunisia, and Egypt. In 2018, the key deliveries to Moscow were from Iran, Uzbekistan, and Belarus by 85%. In the Far Eastern Federal District, imports from China to the Primorsky region account for more than 80%.

4. Conclusion

In general, the data studied are necessary to understand the current situation on the lettuce market and to evaluate the prospects for its development. Of course, the study will be useful for producers and suppliers of lettuce in the context of understanding the current market situation, industry dynamics, monitoring current industry events for building short-term and long-term development and management strategies. This study plays an important role for contractors performing services or supplying equipment or products to enterprises in the industry when developing cooperation. There is
a need to have a reliable information on development in the industry and, accordingly, about the availability of effective demand.

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