Food security of Kuzbass: state, problems, and prospects

N A Panasenko*
FSBEI HE Kuzbass State Agricultural Academy, Kemerovo, Russia

*E-mail: panasenko.1958@mail.ru

Abstract. Food security is one of the essential components providing the country's economic security. The article analyzes the state of the agro-industrial complex in Kuzbass over the past three years. The author analyzed the consumption of food products in comparison with the recommended consumption rates per a person. As a result, some problems were identified. The analysis of the production and consumption of food products in the region was carried out. During the analysis, it was revealed that in 2020, the level of the Kemerovo region self-sufficiency for a larger range of product, with the exception of bread and bakery products, potatoes, eggs and confectionery, is below 100%. The level of economic and physical availability of food in the region has been calculated. It is concluded that the food consumption structure of the Kemerovo region population is not rational; in recent years, the consumption of meat and meat products has increased dramatically by almost 30%, and the consumption of sugar and confectionery has also increased by more than 15%. The population in smaller quantities consume all other food products than it is assumed by the consumption standards. The pursuit of food security is a continuous process, but priorities and the mechanism for their implementation can change under the influence of various factors. The article also presents the prospects for improving food security.

1. Introduction
Any state should take measures not only to increase the size of its own population, but also to ensure its health. To ensure the health of the nation, the state should provide the population with access to food. It is important that food is not only rational, but also affordable. The state must guarantee this not only to the entire population, but also to each person individually. State guarantees in food high quality and safety is called food security. Food security include the fact that at least 60% of food products should be home-produced; in modern conditions, the President of the Russian Federation raised this level for some products to 90%. In the decree of the President of the Russian Federation of January 21, 2020 No. 20 "On Approval of the Doctrine of Food Security of the Russian Federation", the percentage of home-produced products has been adjusted. In this article, the author considers the state of food security in Kuzbass, shows its main problems and proposes prospects for its improvement.

2. Materials and methods
To analyze the current state, the researchers used statistical indicators of the agro-industrial complex in Kuzbass over the past three years, the website of the Ministry of Agriculture of Kuzbass, nutritional standards recommended by the Ministry of Health, the Law of the Kemerovo Region dated 26.12.2018 No. 2035 " . When calculating the indicators, the following methods were used: direct counting, calculation by factors, and index method.
3. Results and discussion
The study included the analysis of the state of food products’ consumption in the Kemerovo region by its resident for 2018-2020. The data obtained were compared with the recommended norms. All the summarized analysis data are presented in Table 1.

Table 1. Average consumption of food products by one resident of the Kemerovo region [1].

| Indicator                      | Recommended consumption rate, kg/year | Consumption, kg/year | Variation, ± | 2018/ Norm | 2019/ Norm | 2020/ Norm |
|--------------------------------|---------------------------------------|----------------------|--------------|------------|------------|------------|
| Bread and bread products       | 96                                    | 113                  | 90,4         | 87,5       | 17         | -5,6       | -8,5       |
| Potato                         | 90                                    | 101                  | 62,3         | 65,5       | 21         | -27,7      | -24,5      |
| Vegetables and cucurbitaceous  | 140                                   | 77                   | 92,9         | 94,1       | -63        | -47,1      | -45,9      |
| Fruits and berries             | 100                                   | 44                   | 66,8         | 65,3       | -56        | -33,2      | -34,7      |
| Meat and meat products         | 73                                    | 70                   | 95,0         | 93,0       | -3         | 22         | 20         |
| Milk and dairy products        | 325                                   | 200                  | 238,3        | 242,9      | -125       | -86,7      | -82,1      |
| Eggs, pcs.                     | 260                                   | 275                  | 240          | 246        | 15         | -20        | -14        |
| Fish and fish products         | 22                                    | 19,5                 | 19,5         | 19,5       | -2,5       | -2,5       | -2,5       |
| Sugar and confectionery        | 24                                    | 32                   | 27,7         | 27,8       | 8          | 3,7        | 3,8        |
| Vegetable oil and other fats   | 12                                    | 10                   | 11           | 10,8       | -2         | -1         | 1,2        |

Analyzing the consumption rate of bread and bread products and comparing it with the recommended norms, we can say that Kuzbass people consumed less than the norm in 2019-2020. The consumption of potatoes has also decreased: in 2018, it was consumed by 12% more than the norm, but in 2019-2020, its consumption decreased by almost 30%. The residents of Kuzbass do not consume enough vegetables and cucurbitaceous, despite the fact that their consumption increased by 17.1 kg per year over the analyzed period, the shortage of vegetable products amounted to more than 30% in 2020. In addition, there has been detected insufficient consumption of fruits and berries; during the analyzed period their consumption increased by 21.3 kg, this indicator was more than 30% below the recommended norm. The consumption rate of meat and meat products showed another situation, on the contrary, it is the opposite: Kuzbass people consume them by 30% more than it is offered according to the norms. Despite the increasing indicators, the situation with milk and dairy products’ consumption has been improving much more slowly; the consumption deficiency was almost 25% in 2020. The consumption of eggs is also decreasing; in 2020, the deviation was 5% below the norm. Under consumption was also observed in fish products by more than 10% annually. Deficiency in consumption of vegetable oil and other fats was by an average of 10%. Analyzing the consumption indicators of sugar and confectionery it is obvious that Kuzbass people ate these products more than the norm by 15%.

To analyze the food product consumption in the region as a whole by its residents, we present the population of the Kemerovo region (fig.1).
During the analyzed period, the average annual population of the region decreased by 38.9 thousand people, or 1.5%.

Table 2 summarized the food consumption by residents of the Kemerovo region by the years.

### Table 2. Consumption of food products by residents of the Kemerovo region by the years.

| Indicator                        | Recommended consumption rate, ths. tons | 2018 | 2019 | 2020 |
|----------------------------------|----------------------------------------|------|------|------|
| Bread and bread products         | 257,7                                  | 303,4| 241  | 231,5|
| Potato                           | 241,6                                  | 271,1| 166,1| 173,3|
| Vegetables and cucurbitaceous    | 375,8                                  | 206,7| 247,7| 249  |
| Fruits and berries               | 268,5                                  | 118,1| 178,1| 172,8|
| Meat and meat products           | 196                                    | 187,9| 253,3| 246,1|
| Milk and dairy products          | 872,5                                  | 536,9| 635,3| 642,6|
| Eggs, pcs.                       | 698                                    | 738,3| 639,9| 650,8|
| Fish and fish products           | 59,1                                   | 52,3 | 52   | 51,6 |
| Sugar and confectionery          | 64,4                                   | 85,9 | 73,9 | 73,6 |
| Vegetable oil and other fats     | 32,2                                   | 26,8 | 29,3 | 28,6 |

Kuzbass residents consume bread and bread products less than the norm by 10%. The consumption of potatoes has also decreased by almost 30%. Kuzbass people under-consume vegetables and cucurbitaceous by more than 30%. In addition, inadequate intake of fruits and berries by more than 30% below the norm rate. Almost 25% of dairy products are not consumed. The consumption of eggs is also below the norm by 5%. Under-consumption of fish products is more than by 10% annually, as well as shortage of the vegetable oil and other fats’ consumption is. However, the consumption of meat and meat products is by 30% higher the suggested norms. Confectionery and sugar are consumed more than the norm by 15%.

To analyze production and consumption, the data on food production in the Kemerovo region were summarized and compared in Table 3.

### Table 3. Food production in the Kemerovo region in 2020, ths tons [2, 3].

| Indicator                        | Production | Consumption | Self-sufficiency rate of food products, % |
|----------------------------------|------------|-------------|------------------------------------------|
| Bread and bread products         | 280        | 231,5       | 120,9                                    |
The analysis showed that the level of self-sufficiency of the Kemerovo region in 2020 for a larger type of product, with the exception of bread and bakery products, potatoes, eggs, sugar and confectionery, is below 100%.

To calculate the level of food economic availability in the region, there was used the methodology proposed by D.G. Olovyannikov [4].

This methodology involves determining the food economic availability based on the following coefficients:
- poverty (Kp) - it reflects the share of the population with money incomes below the subsistence level, and it is calculated as the ratio of the population with incomes below the subsistence level to the total population;
- the purchasing power of the population income in the region (Ki), which is defined as the ratio of the subsistence minimum and the per capita income;
- income concentration (Gini index) (Kg), which characterizes the degree of uneven distribution of the population by income level.

The population of the Kemerovo region for the analyzed period decreased by 1.6%, while the population with monetary incomes below the subsistence level decreased by 6.2%. The average per capita income of the population per month increased by 8%, and the value of the minimum subsistence amount also increased by 12.1%. As a result, the poverty rate decreased by 3.6%, and the Gini index also decreased by 1.2%. The coefficient of purchasing power of household income increased by 3.7%. But the growth in purchasing power is not enough to say that the population of Kuzbass has begun to eat better.

### Table 4. Economic availability of food in Kuzbass for 2018 – 2020.

| Indicator                                      | 2018 | 2019 | 2020 | 2019/2018 | 2020/2019 | 2020/2018 |
|------------------------------------------------|------|------|------|-----------|-----------|-----------|
| Population, ths. people                       | 2684.6 | 2666.1 | 2645.7 | 99.3      | 99.2      | 98.6      |
| Average per capita income of the population, per month, rubles | 23166 | 24415 | 25029 | 105.4     | 102.5     | 108       |
| Population with incomes below the subsistence level, , ths. people | 374.1 | 363.4 | 350.9 | 97.1       | 96.6      | 93.8      |
| Subsistence minimum, on average per capita, rubles per month | 9278 | 10066 | 10403 | 108.5     | 103.3     | 112.1     |
| Poverty rate                                   | 0.139 | 0.136 | 0.133 | 97.8       | 97.8      | 96.4      |
| Purchasing power ratio of household income     | 0.401 | 0.412 | 0.416 | 102.7      | 101       | 103.7     |
| Gini index                                     | 0.411 | 0.411 | 0.406 | 100        | 98.8      | 98.8      |
4. Conclusions

Analysis of the economic affordability level of food products made it possible to identify the following problems affecting the food security in Kuzbass:

- the food structure of the population in the Kemerovo region is not rational, in recent years the consumption of meat and meat products has increased by almost 30%, and the consumption of sugar and confectionery has also increased by more than 15%. While all other food products are consumed in smaller quantities than it is assumed by the norms of consumption;
- in Kuzbass there is shortage of some local food products, such as vegetables and cucurbitaceous, fruits and berries, meat and meat products, milk and dairy products, fish, vegetable oils and other fats;
- despite the fact that the number of the population with monetary incomes below the subsistence level is decreasing, more than 13% of the population still remains below the poverty line, and this affects the structure of the population's nutrition and the growth of its purchasing power;
- the Gini index is decreasing, but social inequality in incomes still persists, since the subsistence minimum is growing (as well as the average per capita income of the population), but its rate is not quick enough to overcome poverty.

Considering physical availability of food, it was determined by the area of shopping facilities per 1,000 inhabitants. In the Kemerovo region, the area of retail space is 845 m² per 1,000 people, with a norm of 600 m² per 1,000 people (according to the law KO No. 105-OZ dated December 28, 2016 "On the establishment of standards for the minimum provision of the population with retail space").

The pursuit of food security is an ongoing process, but priorities and the mechanism for its implementation can change under the influence of various factors. Prospects for improving food security are spelled out in the Food Security Doctrine of the Russian Federation [6].

The Doctrine presents the main directions of state policy in the field of ensuring food security. These directions include:
- availability of good-quality food products;
- support for the most needy segments of the population;
- increasing crop productivity;
- introduction of arable land into circulation;
- development of pedigree livestock breeding, seed selection and production;
- creation of new technologies for processing and storage of agricultural products and a number of other important activities.

Based on the Doctrine of Food Security of the Russian Federation, authorities of the region developed a Strategy for the Development of Agriculture, Food and Processing Industry of the Kemerovo Region for the period up to 2035 [7].

Despite the fact that food production in Kuzbass is behind their consumption, Kuzbass commodity producers have great potential. However, in order to be able to implement it, targeted support of agricultural producers is needed. The state supports agricultural enterprises, but the measures being currently offered are not enough. Therefore, it is necessary to attract large investors.

In the context of crop production, in Kuzbass there are agricultural lands that are not involved in circulation. It is advisable to increase territories of arable areas sown with elite seeds up to 7-8%, to increase the use of organic fertilizers. In animal husbandry, the priority is considered to be the complete elimination of the leukemic livestock, the expansion of the network of breeding farms. It is also necessary to pay attention to the creation of family farms, the development of a marketing and processing system for livestock products. To increase the performance of livestock, the growth rate of fodder resources is necessary that to be in advance to the growth rate of livestock.

One of the most important tasks in the development of the agro-industrial complex of the Kemerovo region is to create conditions for effective trade in agricultural products, raw materials and food products on the food market of the Kemerovo region. Accomplish this it is necessary to stimulate the participation activity of agricultural producers and organizations of the agro-industrial complex of the Kemerovo region in tenders for realization of state and municipal orders to supply agricultural products, raw
materials and food, as well as to develop fair trade or to increase the volume of exports of agricultural products.

To promote the products of regional producers to foreign markets, it is necessary to remove trade and administrative barriers that impede the access of products of regional producers to a specific export market.

References
[1] Territorial body of the Federal State Statistics Service for the Kemerovo Region URL: https://kemerovostat.gks.ru/
[2] Federal State Statistics Service URL: https://rosstat.gov.ru/folder/11188?print=1
[3] Administration of the Government of Kuzbass URL: https://ako.ru/oblast/ekonomika-i-socialnyaya-sfera/kuzbass-
[4] Olovyannikov D G 2009 Methodology for assessing the food security of a region on the example of the Republic of Buryatia Bulletin of the Irkutsk State Economic Academy 3 60 – 63 URL: http://izvestia.isea.ru/pdf.asp?id=4878
[5] Bereznev S V The state and threats to food security of the Kemerovo region / URL: https://cyberleninka.ru/article/n/sostoyanie
[6] Decree of the President of the Russian Federation of January 21, 2020 No.20 "On approval of the Doctrine of food security of the Russian Federation"
[7] Order of March 7, 2019 No. 143-r "On Approval of the Strategy for the Development of Agriculture, Food and Processing Industry of the Kemerovo Region for the period until 2035" URL: https://bulleten-kuzbass.ru/bulletin/220691
[8] Order of 05.05.2016, No. 162-r "On the development of import substitution in the Kemerovo region URL: http://pravo.gov.ru/