Food Security in Arctic Uluses; Issues of Local Agricultural Production

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Abstract This paper analyzes economically the food security of a local population as well as the local farming of potatoes, milk, meat, fish, and eggs. Data was collected from statistical reports for 2012-2019; the goal of the study was to analyze the food security in the Arctic municipalities of the Republic of Sakha (Yakutia). The study has shown that only fishing is a well-performing industry to date. Local potato farming is naturally limited, while vegetables are imported. Compared to the City of Yakutsk, some municipalities have 2 to 6 times higher food prices, or even 7 times higher. Gross production of eggs has risen by 131%, still not enough to be significant. The paper identifies the key issue of the agricultural market in the region. It discusses issues and makes proposals with regard to the development of the agroindustrial complex (AIC). In particular, the paper proposes establishing poultry and rabbit farming as well as local production of vegetables and potatoes.

1. Introduction

Food security in the Arctic Zone of the Republic of Sakha (Yakutia) is problematic, and so is the regional agricultural production, which is why the Republic relies heavily on imports. Food security, including access to foods of ecologically, epidemiologically, veterinary-wise, and otherwise appropriate quality is one of the government’s most important obligations.

To that end, Presidential Decree No. 20 dd. January 21, 2020 (Decree to Approve the Food Security Doctrine of the Russian Federation) has been adopted that says,

– “Russia’s food security is defined herein as such socioeconomic state of the art, in which the Russian Federation does not depend on food imports, and standard-compliant foods are available and affordable to any citizen of the country in quantities no less than reasonably required for an active and healthy lifestyle;

– Russia shall not depend on food imports, i.e. it shall be able to produce core agricultural products, raw materials, and foods independently and domestically. This state is defined herein as food independence;

– nutrition norms are defined herein as menu of foods in the quantity and proportions consistent with the state-of-the-art understanding of optimal nutrition adjusted for the actual dietary habits of the majority of the population;

– food affordability is defined herein as the ability to purchase foods of appropriate quality at the current prices in the quantity and assortment that are consistent with the nutrition norms;
food availability is defined herein as such state of the logistics that enables people in all human settlements in the country to have access to foods, purchased or otherwise provided, in the quantity and assortment that are consistent with the nutrition norms.”

The Republic of Yakutia focuses mostly on the delivery of cargo and foods to its Arctic and northern municipalities (also referred to as the ‘ulus’), since harsh climates, the shortness of season when the routes are navigable, and some settlements being too remote and hard to reach are what calls for a well-established and coordinated action on the part of all parties to such importation.

The scientific significance of this paper lies in the fact that it analyzes the importation of staple foods from 2012 to 2019-2020; it thereby identifies how the selling prices of staple foods are excessively high in the Arctic municipalities compared to the City of Yakutsk. The paper also highlights the fact that the local production of staple foods is insufficient.

2. Theory
Pursuant to the Presidential Decree No. 296 dd. May 2, 2014 (Decree on the Arctic Lands of the Russian Federation), Abyisky, Allaikhovsky, Anabarsky, Bulunsky, Verkhnekolymsky, Vervoyansky, Zhigansky, Momsky, Nizhnekolymsky, Oleneksky, Srednekolymsky, Ust-Yansky, and Eveno-Bytantaysky Municipalities are in the Arctic Zone.

The Republic of Sakha also has Law No. 119-3N 241-III dd. February 20, 2004 in place (On Special Conditions of Importing Cargo to the Arctic and Northern Municipalities of the Republic of Sakha (Yakutia)). Pursuant to the said Decree, the Republic’s Government has adopted its Resolution No. 604 dd. December 27, 2012 (Resolution to Improve the Provision of Foods to the Remote and Hard-to-Reach Settlements in the Republic of Sakha (Yakutia)), which sets forth an extended list of staple foods as well as a list of settlements to be provided such foods governmentally. The document also describes the organization of imports and sales, as well as the procedures for exporting locally produced foods from the Arctic municipalities.

The extended list of staple foods includes: flour, pasta, vegetable oil, cereals, tea, salt, sugar, canned and processed meat, canned and processed fish, milk powder, condensed milk, canned and processed fruits and vegetables, baby foods (puree, juices, formulas, and milk powder-based foods for children), milk and dairy products, vegetables and melons, fresh fruits, eggs, margarine, sausages, and confectionery. Procedures are in place for the centralized importation of these foods to the Arctic and northern municipalities, remote and hard-to-reach settlements of the Republic. Yakutopttorg and Tuimada-Agrosnab are the companies responsible for such import.

3. Results
Focus in this research needs to be made on the state of the art with regard to local food security as well as the local agricultural production in the Arctic municipalities.

Every year, the Republic’s budget allocates substantial funding to support the delivery of staple foods to the remote and hard-to-reach settlements; funding comes in the form of reimbursing part of flour import-associated transport costs, reimbursing road/river/air transport costs, and subsidizing the interest rates payable on credit lines opened with credit institutions or elsewhere.
As shown in Figure 1, from 2012 to 2020 the Republic’s government will have subsidized, issued state-funded credits, and provided government guarantees for a total of 4 billion 626 million rubles; budget funding has been rising every year.

In the future, pursuant to the Presidential Decree of the Russian Federation No. 20 dd. January 21, 2020 (Decree to Approve the Food Security Doctrine of the Russian Federation) and to the Head of the Republic of Sakha (Yakutia)’s Decree No. 232 dd. December 21, 2018 (Strategic Developments in the Agriculture of the Republic of Sakha (Yakutia)), more funds will need to be allocated from the Republic’s budget.

Government support is what enables Arctic and northern municipalities to import staple foods and keep prices at bay; however, food security is still a concern. The authors hereof have calculated the total requirement for staple foods, namely agricultural products, in accordance with the legal regulations, namely Federal Law No. 227-FZ dd. December 3, 2012, Rev. December 28, 2017 (On the Russian Federation-Wide Market Basket), Law of the Republic of Sakha (Yakutia) 1237-З No. 29-V (On the Republic of Sakha (Yakutia)’s Market Basket), and Resolution of the Russian Government No. 54 dd. January 28, 2013, Rev. December 26, 2018 (Resolution to Approve Market Basket Guidelines for Different Demographics in Russian Regions).

Table 1 shows that the Arctic municipalities need to import and/or produce 4537 tons of potatoes, 7336.9 tons of vegetables, 4534.4 tons of meat, 2147.8 tons of fish, 19,274.0 tons of milk and dairy products, and 16,014.6 thousand eggs per annum to fully cover the requirements of their population. Calculations are based on the statistics available from the Republic’s agencies and statistics offices.

Table 2 to 7 show much is produced locally and how much is imported (exclusive of for-profit sales on the part of grocery shops and sole proprietors) against the actual demand for agricultural products; they thus show the extend to which the requirement is met, %. Compared to the annual requirement of 4537 tons of potatoes, the annual production has only been 390 tons and the annual imports have averaged 761.3 tons, thus covering only 25.4% of the requirement, see Table 2. Compared to the annual requirement of 7336.9 tons of vegetables, the annual production has only been 260.3 tons and the annual imports have averaged 272.4 tons, thus covering only 7.3% of the requirement, see Table 3. Compared to the annual requirement of 4534.4 tons of meat, the annual production has only been 1823.42 tons and the annual imports have averaged 95.9 tons, thus covering only 42.3% of the requirement, see Table 4. Compared to the annual requirement of 2147.9 tons of fish, the annual production has been 4553.8 tons, thus providing for 212% of the requirement, see Table 5. Compared to the annual requirement of 19,274 tons of milk and dairy products, the annual production has been 5499.1 tons, thus only covering 28.5% of the requirement, see Table 6. Compared
to the annual requirement of 16,014.5 thousand eggs, the annual production has been 351.1 thousand, and the imports averaged 60.4 thousand, thus only covering 6% of the requirement. Apparently, it is only fish that these municipalities can produce for themselves and for exportation.

Table 1. Calculated consumption of agricultural products in the Arctic municipalities.

| Product                  | Average consumption per person per annum, kg / pcs. | Total population according to the statistics as of Jan 1, 2020 | Total annual consumption, tons /thousand pcs. |
|--------------------------|-----------------------------------------------------|----------------------------------------------------------------|----------------------------------------------|
|                          | Total:                  | including able-bodied population pensioners children | Total:                  | including able-bodied population pensioners children |
|土豆                  | 201 70 60 71 67,854 24,246 22,832 20,776 4539 1704 1370 1465 |
|蔬菜                  | 325 113 99 113 67,854 24,246 22,832 20,776 7340 2730 2260 2350 |
|肉类                  | 199 74 68 57 67,854 24,246 22,832 20,776 4537 1787 1557 1193 |
|鱼类                  | 95 35 31 28 67,854 24,246 22,832 20,776 2149 851 708 590 |
|乳制品                  | 860 271 229 360 67,854 24,246 22,832 20,776 19,282 6563 5233 7486 |
|鸡蛋                  | 480 260 220 67,854 24,246 22,832 20,776 11,327 6304 5023 0 |

Table 2. Local production and importation of potatoes against the total requirement: 2012-2019.

| Municipality       | Total annual consumption, tons | Produced, tons | Imported, tons | % of the requirement |
|--------------------|-------------------------------|---------------|---------------|---------------------|
| Abyisky            | 264.1                         | 14.1          | 40.3          | 30.2                |
| Allaikhovsky       | 180.3                         | 0.1           | 44.5          | 18.1                |
| Anabarsky          | 246.1                         | 32.3          | 5.7           |                     |
| Bulunsky           | 571.4                         | 107.4         | 39.9          |                     |
| Verkhnekolynsky    | 269.2                         | 179.9         | 185.8         | 49.4                |
| Verkhoynsky        | 740.5                         | 83.7          | 26.2          | 39.7                |
| Zhigansky          | 276.7                         | 27.5          | 29.4          | 21.3                |
| Momsky             | 267.2                         | 53.7          | 32.9          | 30.2                |
| Nizhnekolynsky     | 287.0                         | 0.3           | 58.3          | 20.5                |
| Oleneksky          | 285.8                         | 1.7           | 84.3          | 17.5                |
| Srednekolynsky     | 490.7                         | 27.5          | 72.5          | 21.5                |
Table 3. Local production and importation of vegetables against the total requirement: 2012-2019.

| Municipality          | Total annual consumption, tons | Produced | Imported | % of the requirement |
|-----------------------|--------------------------------|---------|----------|----------------------|
| Abyisky               | 427.5                          | 19.1    | 25.4     | 15.3                 |
| Allaikhovsky          | 291.6                          | 0.9     | 31.8     | 8.2                  |
| Anabarsky             | 397.2                          | 0.6     | 3.1      | 0.4                  |
| Bulunsky              | 921.6                          |         | 78.4     | 18.0                 |
| Verkhnekolymsky       | 435.7                          | 46.8    | 11.7     | 4.9                  |
| Verkhoyansky          | 1198.3                         | 93.1    | 14.6     | 24.1                 |
| Zhigansky             | 447.6                          | 16.2    | 7.6      | 5.5                  |
| Momsky                | 432.1                          | 40.6    | 30.4     | 15.3                 |
| Nizhnekolymsky        | 464.6                          | 2.2     | 12.2     | 3.1                  |
| Oleneksky             | 461.6                          | 2.9     | 22.0     | 3.1                  |
| Srednekolymsky        | 794.1                          | 27.7    | 23.1     | 6.7                  |
| Ust-Yansky            | 753.3                          |         | 6.9      | 2.2                  |
| Eveno-Bytantaysky     | 311.7                          | 10.2    | 5.2      | 0.2                  |
| **Total**             | **7336.9**                     | **260.3**| **272.4**| **7.3**              |

Table 4. Local production and importation of meat against the total requirement: 2012-2019.

| Arctic municipality  | Total annual consumption, tons | Produced | Imported | % of the requirement |
|----------------------|--------------------------------|---------|----------|----------------------|
| Abyisky              | 266.1                          | 3.5     | 5.0      | 4.7                  |
| Allaikhovsky         | 180.7                          | 1.8     | 5.3      | 2.9                  |
| Anabarsky            | 242.4                          | 126.2   |          | 22.0                 |
| Bulunsky             | 572.8                          | 72.8    | 6.8      | 29.0                 |
| Verkhnekolymsky      | 274.5                          | 18.6    | 2.1      | 2.8                  |
| Verkhoyansky         | 740.9                          | 843.1   | 11.8     | 311.9                |
| Zhigansky            | 274.1                          | 14.4    | 2.9      | 6.6                  |
| Momsky               | 263.4                          | 15.3    | 0.8      | 5.6                  |
| Nizhnekolymsky       | 287.3                          | 84.0    | 16.8     | 35.8                 |
| Oleneksky            | 281.9                          | 5.0     | 2.5      | 1.5                  |
| Srednekolymsky       | 489.7                          | 167.0   | 8.1      | 37.3                 |
| Ust-Yansky           | 468.9                          | 226.1   | 25.9     | 131.5                |
| Eveno-Bytantaysky    | 191.7                          | 246.0   | 7.9      | 5.6                  |
### Table 5. Local production and importation of fish against the total requirement: 2012-2019.

| Arctic municipality | Total annual consumption, tons | Produced | Imported | % of the requirement |
|---------------------|--------------------------------|---------|----------|----------------------|
| Abyisky             | 125.7                          | 145.4   | 0.0      | 115.7                |
| Allaikovsky         | 85.5                           | 563.5   | 0.0      | 659.1                |
| Anabarsky           | 115.4                          | 52.9    | 0.0      | 45.8                 |
| Bulunsky            | 272.1                          | 1355.0  | 0.0      | 498.0                |
| Verkhneolymsky      | 129.6                          | 101.8   | 0.0      | 78.5                 |
| Verkhoyansky        | 350.6                          | 2.0     | 0.0      | 0.6                  |
| Zhigansky           | 129.9                          | 260.7   | 0.0      | 200.7                |
| Momsky              | 125.0                          | 0.0     | 0.0      | 0.0                  |
| Nizhneolymsky       | 135.9                          | 758.6   | 0.0      | 558.2                |
| Oleneksky           | 134.0                          | 0.0     | 0.0      | 0.0                  |
| Sredneolymsky       | 231.8                          | 214.8   | 0.0      | 92.7                 |
| Ust-Yansky          | 221.4                          | 1099.1  | 0.0      | 496.4                |
| Eveno-Bytantaysky   | 91.0                           | 0.0     | 0.0      | 0.0                  |
| **Total**           | **2147.9**                     | **4533.8** | **0.0** | **212.0** |

### Table 6. Local production and importation of milk against the total requirement: 2012-2019.

| Arctic municipality       | Milk and dairy products, tons |
|---------------------------|-------------------------------|
|                           | Total annual consumption, tons | Produced | Imported | % of the requirement |
| Abyisky                   | 1114.7                        | 186.2    | 0.0      | 16.7                |
| Allaikovsky               | 764.2                         | 5.9      | 0.0      | 0.8                 |
| Anabarsky                 | 1057.0                        | 0.0      | 0.0      | 0.0                 |
| Bulunsky                  | 2396.6                        | 13.4     | 0.0      | 0.6                 |
| Verkhneolymsky            | 1117.7                        | 205.7    | 0.0      | 18.4                |
| Verkhoyansky              | 3148.6                        | 3499.8   | 0.0      | 111.2               |
| Zhigansky                 | 1189.4                        | 46.6     | 0.0      | 3.9                 |
| Momsky                    | 1154.7                        | 286.6    | 0.0      | 24.8                |
| Nizhneolymsky             | 1220.5                        | 0.4      | 0.0      | 0.0                 |
| Oleneksky                 | 1229.2                        | 61.0     | 0.0      | 5.0                 |
| Sredneolymsky             | 2093.7                        | 945.7    | 0.0      | 45.2                |
| Ust-Yansky                | 1964.8                        | 46.8     | 0.0      | 2.4                 |
| Eveno-Bytantaysky         | 822.9                         | 201.0    | 0.0      | 24.4                |
| **Total**                 | **19,274.0**                  | **5499.1** | **0.0** | **28.5** |
Table 7. Local production and importation of eggs against the total requirement: 2012-2019.

| Arctic municipality | Total annual consumption, tons | Produced | Imported | % of the requirement |
|---------------------|--------------------------------|----------|----------|----------------------|
| Abyisky             | 934.6                          | 0.0      | 3.8      | 0.6                  |
| Allaikovsky         | 636.8                          | 4.9      | 3.8      | 1.0                  |
| Anabarsky           | 865.2                          | 0.0      | 0.0      | 0.0                  |
| Bulunsky            | 2031.1                         | 2.4      | 5.2      | 0.8                  |
| Verkhnekoymsky      | 960.3                          | 26.5     | 5.3      | 1.2                  |
| Verkhoyansky        | 2611.7                         | 28.8     | 10.9     | 4.1                  |
| Zhigansky           | 971.0                          | 45.2     | 1.1      | 4.9                  |
| Momsy               | 935.6                          | 0.0      | 8.0      | 0.8                  |
| Nizhnekoymsky       | 1012.3                         | 10.6     | 7.4      | 1.8                  |
| Olenecksky          | 1003.3                         | 41.2     | 2.4      | 2.5                  |
| Srednekoymsky       | 1727.8                         | 184.3    | 3.1      | 11.4                 |
| Ust-Yansky          | 1644.7                         | 7.0      | 4.2      | 1.6                  |
| Eveno-Bytantsaysy   | 680.1                          | 0.2      | 5.2      | 0.0                  |
| **Total**           | **16,014.5**                   | **351.1**| **60.4** | **2.6**              |

Statistical data above suggests the local population is critically undersupplied potatoes, vegetables, and eggs. Insufficient imports force the population to purchase foods in commercial stores at inflated prices, see the next slide. Pricing is given per monitoring data as of September 21, 2020.

To correctly evaluate the pricing situation with regard foods and fruits sold by commercial grocery stores and sole proprietors, the researchers have collected data in the villages of Batagay and Betenkes, Verhoyansky Municipality. The prices were then compared against those in the City of Yakutsk. Tables 8 and 9 show the price differences, which are a factor of 2 to 6 or even 7.

Table 8. Food prices in Verkhoyansky Municipality compared to the average prices in Yakutsk as of September 21, 2020.

| No.  | Food        | Unit of measurement | Average prices Yakutsk's, rubles | IP Chirikov | Price difference against Yakutsk, factor | IP Ammosov | Price difference against Yakutsk, factor |
|------|-------------|---------------------|----------------------------------|-------------|------------------------------------------|------------|------------------------------------------|
| 1    | Potatoes    | kg                  | 60.00                            | 250.00      | 4.17                                     | 280.00     | 4.67                                     |
| 2    | Carrots     | kg                  | 80.00                            | 300.00      | 3.75                                     | 350.00     | 4.38                                     |
| 3    | Onions      | kg                  | 60.00                            | 280.00      | 4.67                                     | 260.00     | 4.33                                     |
| 5    | Cabbage     | kg                  | 40.00                            | 280.00      | 7.00                                     | 250.00     | 6.25                                     |
| 6    | Paprika     | kg                  | 150.00                           | 400.00      | 2.67                                     |            |                                          |
| 8    | Cucumbers   | kg                  | 180.00                           | 400.00      | 2.22                                     |            |                                          |
| 9    | Tomatoes    | kg                  | 210.00                           | 400.00      | 1.90                                     |            |                                          |
| No. | Food         | Unit of measurement | average Yaks, prices, rubles | Batagay | highest price factor against Yaks. factor | highest price factor against Yaks. factor | highest price factor against Yaks. factor |
|-----|--------------|---------------------|-----------------------------|---------|-----------------------------------------|-----------------------------------------|-----------------------------------------|
| 1   | Potatoes     | kg                  | 60.00                       | 260.00  | 240.00                                  | 250.00                                  | 300.00                                  |
| 2   | Carrots      | kg                  | 80.00                       | 250.00  | 230.00                                  | 245.00                                  | 300.00                                  |
| 3   | Onions       | kg                  | 60.00                       | 260.00  | 239.00                                  | 210.00                                  | 300.00                                  |
| 4   | Cabbage      | kg                  | 40.00                       | 240.00  | 240.00                                  | 240.00                                  | 240.00                                  |
| 5   | Paprika      | kg                  | 150.00                      | 400.00  | 410.00                                  | 390.00                                  | 390.00                                  |
| 6   | Cucumbers    | kg                  | 180.00                      | 310.00  | 320.00                                  | 300.00                                  | 300.00                                  |
| 7   | Tomatoes     | kg                  | 210.00                      | 300.00  | 320.00                                  | 295.00                                  | 295.00                                  |
| 8   | Apples       | kg                  | 180.00                      | 430.00  | 405.00                                  | 380.00                                  | 380.00                                  |
| 9   | Mandarins    | kg                  | 200.00                      | 410.00  | 400.00                                  | 395.00                                  | 395.00                                  |
| 10  | Bananas      | kg                  | 150.00                      | 370.00  | 380.00                                  | 370.00                                  | 370.00                                  |
| 11  | Pears        | kg                  | 180.00                      | 380.00  | 395.00                                  | 390.00                                  | 390.00                                  |
| 12  | Oranges      | kg                  | 150.00                      | 395.00  | 370.00                                  | 380.00                                  | 380.00                                  |
| 13  | Vegetable    | pc                  | 100.00                      | 130.00  | 110.00                                  | 125.00                                  | 125.00                                  |
| 14  | Beef         | kg                  | 450.00                      | 550.00  | 550.00                                  | 550.00                                  | 550.00                                  |
| 15  | Pork         | kg                  | 300.00                      | 430.00  | 380.00                                  | 410.00                                  | 410.00                                  |
| 16  | Stew         | pc                  | 145.00                      | 180.00  | 165.00                                  | 170.00                                  | 170.00                                  |
| 17  | Saury        | pc                  | 108.00                      | 95.00   | 90.00                                   | 90.00                                   | 90.00                                   |
| 18  | Sprat        | pc                  | 50.00                       | 55.00   | 60.00                                   | 51.00                                   | 51.00                                   |
| 19  | Eggs a piece | pc                  | 8.50                        | 19.00   | 17.00                                   | 18.50                                   | 18.50                                   |

Table 9. Food prices in Verkhoyansky Municipality compared to the average prices in Yakutsk as of September 21, 2020.
Statistics over the last three years shows the gross yield of vegetables, gross milk yield, and gross production of livestock and poultry for meat, see Tables 10 to 12. Compared to previous years, 2019 saw a sharp decline in the gross potato and vegetable yields, gross milk yield, and gross production of livestock and poultry for slaughter. A positive trend was observed in fish farming. Gross production of eggs has risen by 131%, still not enough to be significant.

Table 10. Gross yields and slaughter, staple foods, 2017.

| Municipality   | eggs, thou. pcs. | potatoes, tons | vegetables, tons | milk tons | meat products, tons | fish products, tons |
|----------------|------------------|----------------|------------------|-----------|---------------------|--------------------|
| Abyisky        | 23.3             | 16.0           | 501.9            | 87.4      | 270.4               |                    |
| Allaikhovsky   | 1.3              | 0.3            | 4.5              | 2.2       | 724.8               |                    |
| Anabarsky      | 21.3             |                |                  | 232.1     | 7.3                 |                    |
| Bulunsky       | 4.1              |                | 3.1              | 26.5      | 1035.1              |                    |
| Verkhneolymsky | 22.9             | 289.1          | 94.1             | 97.5      | 77.3                |                    |
| Verkhoyansk    | 26.0             | 0              | 172.4            | 3723.1    | 869.0               | 5.0                |
| Zhigansk       | 52.0             | 31.6           | 9.0              | 44.0      | 16.7                | 138.8              |
| Momsy          | 17.7             | 75.4           | 64.4             | 265.7     | 131.6               | 7.2                |
| Nizhneolmsky   | 13.4             | 2.3            | 14.4             | 156.3     | 701.6               |                    |
| Oleneksky      | 22.8             |                | 62.3             | 16.9      |                     |                    |
| Sredneolmsky   | 80.1             | 35.0           | 25.0             | 1178.2    | 256.9               | 259.8              |
| Ust-Yansky     | 7.0              |                | 44.5             | 228.5     | 1084.9              |                    |
| Eveno-Byntaysky|                 |                | 396.9            | 234.6     |                     |                    |
| Total          | 268.6            | 6              | 383.5            | 6483.4    | 2356.2              | 4312.2             |

Table 11. Gross yields and slaughter, staple foods, 2018.

| Municipality   | eggs, thou. pcs. | potatoes, tons | vegetables, tons | milk tons | meat products, tons | fish products, tons |
|----------------|------------------|----------------|------------------|-----------|---------------------|--------------------|
| Abyisky        | 26.7             | 25.3           | 565.7            | 65.5      | 203.3               |                    |
| Allaikhovsky   | 1.3              | 0.1            | 1.1              | 5.3       | 3.7                 | 733.5              |
| Anabarsky      | 21.3             | 0.4            |                  | 44.5      | 18.4                |                    |
| Bulunsky       | 4.1              |                | 5.9              |           |                     | 56.3               |
| Verkhneolmsky  | 22.9             | 145.6          | 56.3             | 228.1     | 35.4                | 91.1               |
| Verkhoyansk    | 26.0             | 144.7          | 147.6            | 3482.1    | 1076.0              | 3.0                |
Table 12. Gross yields and slaughter, staple foods, 2019.

| Municipality         | eggs, thousands pcs. | potatoes, tons | vegetables, tons | milk, tons | meat products, tons | fish products, tons |
|----------------------|----------------------|----------------|------------------|------------|---------------------|---------------------|
| Abyisky              | 14.1                 | 19.1           | 186.2            | 3.5        | 145.4               |                     |
| Allaikhovsky         | 4.9                  | 0.1            | 0.9              | 5.9        | 126.2               | 52.9                |
| Anabarsky            | 2.4                  |                | 13.4             | 1.8        | 72.8                | 1355.0              |
| Bulunsky             | 26.5                 | 179.9          | 46.8             | 205.7      | 18.6                | 101.8               |
| Verkhneekolymsky     | 28.8                 | 83.7           | 93.1             | 3499.8     | 843.1               | 2.0                 |
| Zhigansky            | 45.2                 | 27.5           | 16.2             | 46.6       | 14.4                | 260.7               |
| Momsky               | 53.7                 | 40.6           | 286.6            | 15.3       |                     |                     |
| Nizhneekolymsky      | 10.6                 | 0.3            | 2.2              | 0.4        | 84.0                | 758.6               |
| Oleneksky            | 41.2                 | 1.7            | 2.9              | 61.0       | 5.0                 |                     |
| Sredneekolymsky      | 3.0                  | 27.5           | 27.7             | 945.7      | 167.0               | 214.8               |
| Ust-Yansky           | 7.0                  |                |                  | 46.8       | 226.1               | 1099.1              |
| Eveno-Bytantaysky    | 0.2                  | 1.5            | 10.2             | 201.0      | 246.0               |                     |
| Total:               | 1                    | 390.0          | 260.3            | 5499.1     | 1823.8              | 4553.8              |

4. Conclusions

Here are the conclusions that can be made from the analysis of the agricultural product market as to why agricultural production remains lackluster in the Arctic municipalities:

1. Insufficient or nonexistent forage farming in the Arctic. Effective livestock farming requires a sufficient supply of feed concentrates and forage. Given the prohibitive transport costs, reimbursements may turn outrageously expensive. Still, the government has to shoulder it.

2. Harsh climates and a long heating season (as long as almost a year in some municipalities), coupled with a short summer and the farming-at-risk status of the area (cold nights and early frosts) make potato and vegetable farming impractical. The local farms need heated greenhouses and advanced open-ground horticulture. This, once again, requires substantial public subsidies.

3. Costly energy. Constructing a heated greenhouse means exorbitant heating, electricity, and water supply costs. Some may feel tempted to resolve to imports instead. The situation calls for proper feasibility studies. It is up to agricultural engineers to find optimal equipment, to economists to analyze the feasibility of such projects, and to financiers to raise funds.
4. Bear in mind that potatoes and vegetables need temperature and humidity-controlled storage to be preserved. Spoilage stands for excessive losses on the governments’ and the companies’ part. Vegetable storage facilities must be there on the horticultural sites to store and preserve the product. Construction and maintenance of such facilities is not a cheap undertaking.

5. With regard to the sales of agricultural products, it might be problematic to actually process, sort, and package foods so that it looks (and is) marketable. We believe that the problems above, especially with regard to meat, milk, and egg production, could be addressed by adopting fast-track animal husbandry. This term encompasses poultry, rabbit, and goat farming. We believe the government fails to pay due attention to these areas. They could be adopted by small farms, sole proprietors, family farms, and farmsteads in the Arctic municipalities, which would definitely improve local production for the purpose of food security.

5. Proposals

Rabbits are known to provide not only low-calorie meat, but also excellent furs and warm fluff. Many breeds are bred for meat. In winter, rabbits can survive outside without heating or lighting. While it is warm, a single doe gives birth to 21-30 kittens on average, producing 2-2.5 kg of pure low-calorie meat in 4-5 months, or 75 kg meat. A small private farmstead can easily keep 25 females, producing 1,875 kg meat per annum on average. These calculations are, of course, far from refined. Given that rabbits eat greenery, straws, hay, and branches, they are low-maintenance even for the Arctic. A well-organized rabbit farm is extremely profitable. This is why this paper proposes adopting rabbit farming in the Arctic.

As for poultry, let us analyze broiler and geese farming. Russian and international breeders have attained multiple broiler breeds for fast production of high-quality meat. Yakutia is suitable for 11 breeds: Cobb 500, Cobb 700, Ross 308, Ross 708, Hybro 6, Broiler M, Hubbard F 15, Competitor 3, Arbor Acres, Broiler 61, and Cross-Smena. Russian breeders have come up with an industrial hybrid chicken for meat. Smena 9 is a Russian breed that is highly productive at half the price of its international counterparts. It reaches a live weight of 3 to 3.5 kg in two months, 60% to 70% of which is yieldable pure meat. Breeding it requires an incubator and a warm room, high-quality feed concentrates until 1 month of age, then a grain mix comprising wheat, barley, maize, sunflower cake, yeast, fish and bone flour, salt, and grinding impurities. To help produce broiler meat cheaply and incentivize this kind of farming, transport costs need to be fully reimbursed from the budget. Then, even over a short summer people and SMEs will be able to set up poultry farms to provide high-quality broiler meat for themselves and to make low-calorie meat more accessible to the locals. The Republic needs to establish a regional agency that will provide people with high-quality eggs for incubation. Incubator purchase and facility construction need to be financed by virtue of interest-free credit lines issuable by the Entrepreneurship Support Fund; entrepreneur support programs will subsidize some of the costs.

Besides, it could be efficient to set up egg production. In that case, farmers would be able to continuously supply high-quality eggs. Chickens for this purpose need to be bred in January so that they could mature by summer to being laying fresh eggs.

Geese farming is profitable, too. Linda geese reach up to 8 kg in live weight. This breed can be kept even below 0°C, making it suitable for the North. The North is rich in water bodies and lakes, which will help minimize feeding costs.

Goat farming is another sector that could work well in the North. A single nanny produces 3 to 7 kilograms of milk rich in fat. This is a low-maintenance animal and eats far less hay than cattle. Several breeds are suitable for being farmed in the North for profit.

Notably, Resolution of the Government of the Republic of Sakha (Yakutia) No. 113 dd. May 23, 2010 (Resolution to Approve the Procedure for the Issuance of AgroStartup Grants to Farms, and to Determine the Agency Responsible for Agricultural Cooperation and Farmer Support in the Republic) prioritizes conventional aspects of animal husbandry: cattle farming, reindeer herding, and horse
herding. We believe this approach is fundamentally wrong. Poultry, rabbit, and goat farming must be able to evolve on part with the conventional husbandry, especially in the North.

This argument is further reinforced in the Head of the Republic of Sakha (Yakutia)’s Decree No. 232 dd. December 11, 2018 (Strategic Developments in the Agriculture of the Republic of Sakha (Yakutia)), “The agricultural development of the Republic should seek to cover 61% of the local populations dairy requirement, 30% of the meat requirement, 66% of the need for potatoes, 51% of the need for vegetables, and 65% of the need for eggs by 2024. These percentages need to be covered by locally produced foods of appropriate quality.”

Adopting professional income taxes and special rules for self-employed on top of a government support program will boost fast-track animal husbandry: rabbit, poultry, and goat farming.

This will enable us all to solve the country’s common problem: food security guaranteed by local high-quality agricultural production.

6. References

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