Organic poultry farming in Russia: details

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Abstract. Every year in the world, more and more interest in the products of organic agricultural production. It should be noted, however, that environmentally friendly management practices, controlled by an internationally agreed certification system, have significant advantages for the manufacturer. After the entry into force of the Federal Law No. 280 "On organic products and on amendments to certain legislative acts of the Russian Federation" there are many issues that need to be resolved. In this regard, it was important for the authors of the article to understand what difficulties producers of organic products in Russia face.

1. Introduction
The share of Russia in the global organic market does not yet exceed 1%. The reasons for this are the low effective demand of the population, since, as world practice shows, the premium for organic products is on average at least 30%; imperfection of the regulatory framework; and lack of support for organic producers [1]. However, with the regulation of the legislative system for the production of organic products, in particular, the provision of state support and incentives for producers, the situation may change for the better [2].

On January 1, 2020, Federal Law No. 280-FZ "On Organic Products and on Amendments to Certain Legislative Acts of the Russian Federation" came into force in Russia, which regulates the production, storage, transportation, labeling and sale of organic products [3].

In Russia, a number of standards have been introduced, which are the basis for the production and certification of organic products [4]. Products manufactured in accordance with the established rules and checked by certified bodies at all stages of production are marked with the "organic" sign (figure 1), and information about the manufacturer of these products, in accordance with the obtained certificate, is entered into a unified state register available to a wide range of consumers [5-6].

It should be noted that at the present time in the world there is no unified certification system and, accordingly, labeling of organic products. However, for the consumer, any organic labeling is a guarantee that the product has been produced and processed in an environmentally friendly way, in compliance with the principles and values of organic production.

All agricultural production has organic equivalents. In Russia, the production of organic products is most widespread among gardeners, vegetable growers and livestock breeders (in particular, dairy products). Organic poultry farming in Russia is poorly developed [9]. The aim of the study was to review the state and development prospects of the poultry meat market in terms of the development of organic production.
Figure 1. A graphic sign of organic products for the Russian Federation.

The concepts "organic", "bio" and "eco" are equivalent. However, in order not to confuse the consumer, each country uses one, maximum two names [7]. In Russia, the concepts of "eco" and "bio" are currently widely used, the definition of "organic products" ("organic") has been introduced into the law and has been agreed with the requirements of the European Union and international organizations [8]. Unlike foreign buyers who purchased a specific “organic” product and had a clear awareness of the brand and its quality, before the adoption of the Federal Law in Russia, the “organic” niche was occupied mainly by products of personal subsidiary plots, farms and summer cottages, which was perceived consumer as environmentally friendly.

There are clear requirements for "organic" poultry farming technologies, such as:

- Prohibition of keeping poultry in cages. The arrangement of poultry houses should be with easy access to open, dry areas for walking, access to natural growing plants or trays with green plant matter. With this content, the bird has a stronger immunity; less often it is susceptible to diseases. However, the likelihood of contracting infectious diseases from wild birds and animals visiting enclosures is significantly higher than that of birds kept in fully artificial conditions. The bird kept outside the cages has the opportunity to supplement its nutrition with the protein found in insects and seeds, natural amino acids, minerals, and the presence of natural ultraviolet radiation is very important for the bird, since the vitamin D produced in such a bird provides good absorption of calcium, and therefore bone density, healthy feathers, vitality of eggs, strong shells. A sufficient amount of vitamin D in the bird itself makes it possible to produce a richer yolk in the eggs;
- Depending on the longitude and latitude of the geographical location, there may be a lack of sunlight, therefore artificial lighting is allowed, but not more than 16 hours of daylight hours with a continuous period of night rest without lighting for at least 8 hours.
- Selection of slow growing breeds or rearing poultry until the minimum slaughter age is reached [10-11]. In particular, for chickens the minimum slaughter age is 81 days, for ducks of the Peking breed - 49 days; for turkeys and geese - 140 days; for turkeys - 100 days, etc.
2. Materials and methods
First of all, poultry meat is valuable as a source of easily digestible protein. The protein and amino acid nutritional value of all poultry products, which are loved by many for their taste, are covered in many domestic and foreign publications.

For a comparative assessment of quality, organoleptic is an important indicator. In order to assess the attractiveness and quality of broiler and organic-eco poultry meat in the VNIIPP test laboratory center, an expert group was formed from 7 certified tasters. In the course of the study, each taster, using a 9-point scale, filled out a table with quality indicators for three samples.

An important factor in such an assessment is the calculation of the error, which depends on the obtained consistency of expert opinions - the value of the concordance coefficient (W), - which is determined by the formula:

\[
W = \frac{12 \cdot S}{m^2(n^3 - n)}
\]  

Where \( S \) is the sum of the squares of the deviations of the sum of the ranks from the arithmetic mean within the sample for examination; \( m \) - the number of objects taken for examination; \( n \) is the number of experts.

The coefficient of concordance changes in the range \( 0 < W < 1 \).

In the event that \( W = 1 \), then the limits of disagreement in the opinions of experts are minimal. And \( W = 0 \), on the contrary, shows a complete lack of consistency of expert opinions [12]. Therefore, in this case, after repeated testing of experts for readiness for examination, the study should be repeated.

For the qualimetric assessment of the weighting coefficients of poultry meat quality indicators, the rank method was used [13-14]. The examination algorithm is as follows:

- In accordance with the opinion of the expert, quality indicators are distributed in order of preference;
- The most important quality indicator is assigned the highest rank, the rest are assigned lower ranks as their importance decreases;
- The contribution of each indicator to the overall quality assessment is calculated, for which the total rank for each indicator is divided by the total amount of ranks.

To calculate the weighting factors, use the formula:

\[
g_i = \frac{\sum_{j=1}^{n} G_{ij}}{\sum_{i=1}^{m} G_{ij}}
\]  

Where \( G_{ij} \) is the rank of indicator \( j \), set by expert \( i \); \( m \) is the number of quality indicators; \( n \) is the number of experts.

3. Results
We selected three samples of broiler poultry meat from three well-known producers to assess the level of quality of their products. And also three samples from farms producing eco-products of poultry meat with free and semi-free content. The obtained results of expert assessments on quality characteristics for each of the samples by organoleptic properties, taking into account the ranking of points, are presented in the diagram. Corrections for the coefficients of concordance are taken into account in the calculations (figure 2).
Among the experts, the highest degree of agreement was obtained in terms of "Appearance" and "Taste" (W1 = 0.91). According to the indicators "Smell (aroma)" (W2 = 0.61), "Consistency" (W4 = 0.52), "Juiciness" (W5 = 0.63) - the average level of agreement. The obtained coefficients of concordance of experts in this study turned out to be significant and high. Thus, the results of the organoleptic examination can be considered reliable.

4. Discussion

According to the results obtained, semi-free and free content poultry meat is less juicy, but if such a bird is younger in age, then this indicator will not have significant differences from broiler meat. Despite the higher production cost of such poultry and the high complexity of growing, the value indicators of such meat are more preferable. For example, according to the data in table 1 [15], the semi-free and free content of poultry increases the amount of carbohydrates and lipids in meat.

Table 1. Chemical composition and energy value of poultry meat Belyaev N.M. (2019).

| Bird species | Water, g | Lipids, g | Carbohydrates, g | Ash, g | Proteins, g | Energy value, kJ |
|--------------|----------|-----------|------------------|--------|-------------|-----------------|
| Broilers     | 63.8     | 16.1      | 0.5              | 0.9    | 18.7        | 774.5           |
| Chickens     | 61.9     | 18.4      | 0.7              | 0.8    | 18.2        | 837.4           |

The composition of vitamins and minerals in poultry meat, although we studied in different years (2007, 2011 and 2020), but these parameters with a small sample are not so indicative, since they depend on the nutritional quality of a particular bird (table 2).

Table 2. The composition of trace elements and vitamins in poultry meat.

| Bird species     | Vitamins, mg | Mineral substances, mg |
|------------------|--------------|-----------------------|
|                  | A | B | B₂ | PP | Na | K | Ca | Mg | P | Fe |
| Broilers (n = 12)| 0.03 | 0.08 | 0.16 | 3.40 | 119 | 350 | 12 | 30 | 250 | 1.5 |
| Chickens (n = 12)| 0.07 | 0.07 | 0.14 | 3.60 | 130 | 240 | 20 | 32 | 298 | 3.0 |

For a more indicative result according to these characteristics, a sufficiently large sample is required, which will show precisely the tendency for the accumulation of certain substances in the
tissues of a bird of a certain cross. Therefore, we left this factor in the publication for the accumulation of information and designation of average data.

5. Conclusion
Despite the fact that such studies have been carried out for a long time, the level of their implementation on an industrial scale is low. If we talk about the organization of organic poultry farming in Russia, then one should rely on foreign experience, taking into account not only cost-effective production technologies, but also taking into account the accumulated mistakes. The high requirements of certification bodies for the production of organic products can become an obstacle to the development of this business (figure 3).

Figure 3. How organic products are obtained.

The approach to the development of organic agricultural production in our country and, in particular, poultry farming should be comprehensive, including both the improvement of the Russian regulatory framework and the guarantee of state support to producers, and the creation of favorable conditions for the sale of organic products.

In addition, it is necessary to support scientific research in the field of organic production, organize the training of qualified personnel in specialized higher and secondary educational institutions. Comprehensive research, approbation of relevant technologies, critical understanding of international experience will contribute to the development of organic agricultural production in our country.

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