Development of natural semi-finished poultry meat products enriched with iodine

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Abstract. This article briefly covers the problem of iodine deficiency in the country, it is described about the iodine-containing preparation “Yodozin”. Research data is given and illustrates its effect when adding in natural-finished products from poultry meat. In the course of the work, the practical use of the preparation was proved. When it is added to semi-finished products, the mass concentration of iodine increases and is retained in products even after bringing them to culinary readiness. “Yodosin” does not affect the physicochemical and organoleptic characteristics of the product.

1. Introduction

The problem of iodine deficiency is relevant in all regions of Russia. Iodine is important for the normal growth of the child and the development of the brain, as well as to ensure the health of the adult population. According to the Endocrinological Scientific Center, RAMS, insufficient iodine consumption creates serious health problems in 100 million Russians, threatening physical and mental development of 33.7 million children. Scientists WHO have definitely concluded that the intelligence coefficient directly depends on the content of iodine in the body. Every year, 215 thousand children with cerebral disorders caused by iodine deficiency are born in Russia [1].

The iodine is the only trace element that directly participates in the synthesis of hormones. It participates in the production of thyroid hormone - thyroxine, to the creation of which is going to 90 percent of the iodine-consumed. Thyroxin controls and strengthens the intensity of metabolism: water-salt metabolism, exchange of proteins, fats and carbohydrates. And he also regulates the heat exchange in the body, division and growth of cells, the work of the liver and the cardiovascular system [2].

Currently, there are a number of dosage forms containing iodine salts. These are iodide potassium pills in different doses, potassium iodide solution, Lugol’s solution, iodoral-tablet, etc., including plant fees and dry algae containing iodine. Preventive use of inorganic forms of iodine (antistrumin, iodide potassium, microiodine, Lugol’s solution, etc.) is recommended only in the case of a laboratory confirmed chronic iodine deficit from a particular person or organized group of persons. At the same time, an individual need for iodine and the likelihood of hereditary predisposition to autoimmune violations should be taken into account. In so-called environmentally friendly regions, where protective...
systems of the body and so experiencing chronic overvoltage, the use of inorganic iodine preparations is extremely undesirable [3].

All measures for the prevention of iodine defective diseases are based on the provision of physiological level of iodine intake. The recommended daily need for iodine for the human body is presented in table 1 [4].

| Age groups                             | Iodine, µg |
|----------------------------------------|------------|
| Breastfeed children (0–12 months)      | 50         |
| Children of preschool age (1-6 years)  | 100        |
| School children (6-12 years)           | 120        |
| Teens and adults (12 years and older)  | 150        |
| Pregnant and nursing women             | 250        |

Insufficient intake of iodine with food is an obvious fact and correct this provision without disturbing the natural balance of travelers of trace elements, it is possible only to eat in food artificially enriched with this element of products. It should be borne in mind that iodine is a flying element and during long-term heat treatment it almost completely disappears [5].

The only and rapid way to solve the problem of iodine deficiency correction is the use of iodine-containing additives intended for the introduction of them into the composition of food [6].

2. Materials and methods

To create semi-finished poultry meat enriched with iodine, prototypes were developed with the addition of the preparation "Yodozin". The prospect of using this drug is caused by its qualities. "Yodozin" - a high-tech iodine-containing functional additive for the food industry, the unique composition of which ensures the digestibility of
iodine about 98%. The preparation of iodine is in the associated state, has high stability and can be stored for a long time. Such iodine is released only in the stomach of man. Adding a drug to other high-quality indicators of products does not affect. It is thermal resistant. In the «Yodozin», iodine is easily soluble in water and is suitable for any industry of the food industry. The substance can withstand various temperature and humidity modes therefore it does not need to successfully implement any adjustment of manufacturing technology.

Experimental studies were carried out in the accredited Laboratory of the Volga Region Research Institute of Manufacture and Processing of Meat-and-Milk Production using generally accepted techniques and equipment.

The determination of the mass concentration of iodine in semi-finished products of natural poultry meat is carried out according to MUK 4.1.1481-03. The determination of the mass fraction of sodium chloride is carried out according to GOST 9957-2015. Organoleptic indicators were also identified in the already finished semi-finished products according to GOST 9959-2015.

3. Results and discussion

The mass concentration of iodine in natural semi-finished products of poultry meat is presented in table 2.

| Samples                        | Mass concentration of iodine, mg / kg |
|--------------------------------|--------------------------------------|
| Semi-finished turkey meat control | 0.16 ± 0.01                          |
| Semi-finished turkey meat experiment | 1.21 ± 0.02                          |
| Semi-finished chicken meat control | 0.23 ± 0.01                          |
| Semi-finished chicken meat experiment | 1.50 ± 0.03                          |

For a visual demonstration, a graph is represented by the dynamics of the growth of iodine concentration in experiment samples semi-finished products in figure 1.

![Figure 1. Dynamics of the growth of iodine concentration in experiment samples of semi-finished products.](image)

From the data submitted it follows that the «Yodozin» preparation really increased the concentration of iodine in semi-finished products. The study was carried out on samples that have undergone heat treatment to their complete culinary readiness. In experiment samples, iodine did not destroy, which indicates how the preparation showed itself and proving that iodine in it is in fact thermotolerant. The task of enriching products with iodine has been completed.

The mass fraction of sodium chloride in semi-finished products is presented in table 3.
Table 3. Mass fraction of sodium chloride.

| Samples                        | Mass fraction of sodium chloride, % |
|--------------------------------|-------------------------------------|
| semi-finished turkey meat control | 0.8                                 |
| semi-finished turkey meat experiment | 0.9                                 |
| semi-finished chicken meat control   | 0.9                                 |
| semi-finished chicken meat experiment | 1.1                                 |

The preparation «Yodozin» does not affect the change in other physicochemical parameters of semi-finished products.

Organoleptic indicators of finished semi-finished products are presented in table 4.

Table 4. Organoleptic indicators of finished semi-finished products.

| Indicators          | Characteristic                                      |
|---------------------|-----------------------------------------------------|
| Appearance          | Appearance corresponds to this type of product     |
| Color and view      | Infected color of the finished product              |
| Consistency         | Elastic                                              |
| Smell               | Meaty, without foreign odors                        |
| Taste               | Meaty, salty, without foreign tastes                |

According to this, it is clear that the preparation "Yodozin" does not affect the organoleptic indicators of finished semi-finished products.

4. Conclusion

Based on the research, it is possible to state that the «Yodozin» preparation performs its main function, namely, it enriches the natural semi-finished products from the poultry meat, without changing other physicochemical and organoleptic indicators and maintaining the concentration of iodine even after thermal processing of semi-finished products before readiness.

Reference

[1] Dzhatdoeva F A 2011 Prevention of iodine deficiency: information support Nutrition issues 80 (Moscow: Geotar Media) 2 28-61
[2] Micronutrient deficiency Prevention of iodine deficiency, available at http://13.rospotrebnadzor.ru/ (accessed 25 march 2021)
[3] Ponomarev E E, Mamtsiev A N, Kozlov V N and Yarovsky A V 2021 Innovative technologies for the production of iodine-containing complexes: assessment of quality and safety indicators: Monograph (St. Petersburg: Publishing house "Lan") 140
[4] Petunina N A 2011 Iodine deficiency diseases: approaches to diagnosis and treatment Gynecology 18 (Moscow: Consilium Medicum) 4 45-8
[5] Khramova V N, Gorlov I F, Zhivotova T Ya, Martynov A A and Martynova S P 2017 Possibilities of using products of processing of chickpea raw materials in sausage Proceedings of nizhnevolskiy agrouniversity complex: science and higher vocational education (Volgograd: Volgograd state agrarian university) 48 176-83
[6] Gorbunov A V 2010 Intake of iodine and selenium into the human body with different diets Ecology of man (Arkhangelsk: Northern state medical university) 10 3-8
[7] Poznyakovsky V M 2021 Nutrition physiology (St. Petersburg: Publishing house "Lan") 432
[8] Khramova V N and Matrenina D S 2018 Enrichment of meat bread with organic forms of iodine and selenium Proceedings of nizhnevolskiy agrouniversity complex: science and higher vocational education (Volgograd: Volgograd state agrarian university) 50 280-5
[9] Braverman L E 2003 Diseases of the Thyroid (Totowa, NJ: Humana Press) pp 1-17