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**MODELS OF DATA COLLECTION FOR FOOD BALANCES IN  
IMPORT SUBSTITUTION POLICY**

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**Abstract**

The paper considers the issues of food balances as an element of import substitution policy. In order to understand how to expand the elements of agrarian policy to reduce imports it is necessary to have complete information on the level of import dependence, consumer food demand and the channels of food consumption. The ratio of import, production, export and consumption are not the only balance elements. The paper presents the classification of food balances, considers the typical models of data collection for the elements of food balances, including regarding foreign trade turnover, and defines optimization directions of data collection in terms of food balances within the import substitution system. It briefly considers the types of balances, including inter-national comparative food balances; national food balances; regional domestic food balances not for unitary countries; analytical, current, planned and forecast balances. The general scheme of balance formation is briefly discussed. The stages of the strategy for data collection for forecasted food balances within the framework of import substitution policy are defined: determining food demand, formation of food resources, food production (growth of agricultural production for food self-sufficiency; increasing agricultural and food processing; ensuring conditions of natural environment reproduction; producing environmentally friendly products; improving the quality of products), forming import substitution resources for certain types of food, including planning the impact of state and regional policies to expand national (regional) agriculture, distributing food resources, food consumption, government regulation and monitoring of food supply processes.

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## **1. Introduction**

The planning of the development of the national food system as resistant to the effects of various political, biological, socio-economic risks is based on the preliminary collection of data on the needs and opportunities of agriculture to provide the population and the processing industry with raw materials and food. Forecasted data collection is accumulated in the balance of food resources (Arsenault et al., 2015; Balanza et al., 2007). It provides the basis for the agrarian policy, consideration of shortcomings, existing measures of agrarian protectionism, makes it possible to determine the balance of export and import of essential food resources. When implementing the import substitution policy, it is the identification of the share of import in relation to the capabilities of national production that determines the effectiveness of the carriers of agropolitical solutions.

## **2. Problem Statement**

The methodology of analysing existing food balances at the national level for many countries of the world is transparent and has some distortions in data collection.

## **3. Research Questions**

The study highlights the role of food balances in the implementation of the import substitution policy. The objectives include the study of the classification of food balances; review of typical patterns of data collection for food balance items, including regarding foreign trade turnover, and identification of ways to optimize the data collection on forecasted food balances within the import substitution system.

## **4. Purpose of the Study**

The purpose of the study is to analyze the theoretical description of optimizing the collection of data on food balances for the implementation of import substitution policy.

## **5. Research Methods**

The materials included scientific studies on the problems of information provision, methodologies for the formation of food resource balances, data on information resources of national agricultural management services and food systems.

The main methods of study included monographic, analytical, logic, and statistical analysis.

## **6. Findings**

The history of food balances is associated with the theories of the classical economy of A. Smith and physiocrats, including the economic tables of Kene, King, Grunzel, Martens and Nicklisch. But the world's first justified food balance was published by the USSR Statistical Service as part of the 1922 national economic balance. However, due to political and ideological differences, further work on balances since 1928 has been limited. In the USSR, this work was resumed only after World War II

against the background of the interests of the world community in the balance method. To date, much of the balance is accumulated by the FAO and its methodological development is the most traditional and widely used information method for early warning of food aid needs in many countries of the world.

Food Balance Sheet (FBS) provides information for in-depth nutrition analytics of individual countries (Naska et al., 2008); provides insight into the causal relationships and impact of trade liberalization on food security, for example, in Africa (Baye & Musah-surugu, 2020), resource loss accounting (Kummu et al., 2012).

It is according to data that the main structural imbalance on the current world food arena – the surplus in developed countries and the deficit in developing countries – opens up the possibility for significant progress in ensuring food security both in the long and short term (Mellor John, 1988).

The authors analyzed the data of statistical services and determined the classification of food balances.

In terms of territorial coverage, the following are distinguished:

cross-national comparative food balances;

national food balances;

regional intra-national food balances (not for unitary countries).

The largest interethnic comparative base is the FAO food balance statistics module. According to the methodology, the balance is calculated for each main food product according to the flow pattern in physical quantity. The receipts include manufactured products in the country, import, adjusted stocks. The expenditure part includes export items, products fed to agricultural animals, seed stock, expenses of products for non-food purposes, losses during storage and transportation, food supplies available for consumption by people. Additionally, the amount of food per capita is calculated. The food balance contains information on the content of protein, fat, kilocalories.

National balances may contain more detailed information on the distribution of different nutrients, not just weight characteristics (Berners-Lee et al., 2018; Grünberger, 2014). This provides the basis for the analysis of the nutritional structure of the population. The more detailed the balances, the more effective the analysis is to make recommendations for the agrarian policy in the field of preserving the health of the population. The examples of such studies include the assessment of inadequate consumption in South Asian countries (Mark, et al, 2016), the use of FAO-FBS data in international health and nutrition studies, and the identification of FBS strengths, limitations and reliability (Chan-Myae et al., 2020), rationale for the national food consumption model (Lloyd et al., 2020).

National food balances can be adjusted according to natural and climatic conditions and the availability of productive resources. For example, water balances related to future food supply (Yawson, 2020).

The problem of creating international balances is the inaccuracy of a number of information collected, including due to limited access to information in a number of countries around the world. Inaccuracies may be due to differences in the method of collecting information within the country and for international provision, political motives, image restrictions.

Most national balance sheets apply balance sheet requirements from the national policy within the product list. National service methodologies take into account both international recommendations and a

list of their indicator requirements. Thus, in Russia, when compiling balances, data are used from the forms of federal state statistical monitoring of the activities of enterprises and farms involved in the formation and use of food resources: agricultural enterprises: societies and partnerships, other agricultural production enterprises; households of the population; peasant farms; enterprises of industry, wholesale, retail and consumer co-operation. For such products as meat, milk, eggs, grain, potatoes, vegetables, fruits, the volume of production for the year is determined on the basis of annual calculations of crop and livestock products in all categories of farms. Due to the introduction of sanctions and the import substitution policy in 2014, the list of food balances has expanded (for example, the balance of fish and fish products has appeared).

The countries with a federal structure can apply local balances taking into account the characteristics of the terrain, regional features of the population's nutrition, geographical location, and the revenue structure of the local population.

According to the types of evaluation, there are the following balance sheets: analytical, current, planned and forecasted. Analytical food balances compare historical and territorial data. Current food balances provide information on the current status of receipts and expenditures of each individual food. Based on the data and targeted programs, food resource planning models are developed and import and export flows are adjusted based on the analysis of production opportunities. The forecast of the balance sheet from the actual data can have different scenarios.

Information on the current situation is collected by statistical services, but the adjustment includes new uses of food resources. For example, for alternative energy, crops that have traditionally been used as oilseeds or fodder crops are used in a number of countries around the world. Not in all balances you can see the expenditure part in the new areas of the economy.

The data collection strategy for forecasted food balances includes several stages:

- determination of the need for food (clarification of food consumption standards for all population categories in different regions; definition and planning of the population's food needs taking into account territorial zoning; identification of factors affecting the need for food; satisfaction of the population's food demand);
- formation of food resources (establishment of food funds and public food reserves; provision of food to the population and special consumers; reduced import and increased food export; improvement of the transportability and safety of products);
- food production (growth in agricultural production for food self-sufficiency; increasing agricultural and food processing; ensuring conditions of natural environment reproduction; production of environmentally friendly products; improving the quality of products);
- formation of import substitution resources for certain types of food, including the planning of the impact of state and regional policies for the expansion of national (regional) agriculture;
- distribution of food resources (ensuring the availability of the necessary food in accordance with the assortment; formation of specialized markets for agricultural and food products; development of transport and storage systems of agricultural products and food products);
- food consumption (rationalization of the population's nutrition, improvement of its balance; improvement of the range of food products; improvement of the quality and environmental

safety of food; consumption of products not less than the size of the minimum food basket; achieving sustainable consumption of all basic foodstuffs; ensuring physical and economic availability of food);

- state regulation and monitoring of food supply processes (ensuring the interconnected functioning of elements and subsystems; reduction of time for the generation and movement of food resources; monitoring of information support of the main processes; monitoring of compliance of the actual state of the control object with normative parameters and their correction; development and implementation of targeted product programs).

## 7. Conclusion

The implementation of the data collection strategy for forecasted food balances is essential for the import substitution policy at the national and regional levels and provides an information base for food security. The adjustment of food balances to the national production outlook is key to the country's food security planning.

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## References

- Arsenault, J., Hijmans, R., & Brown, K. (2015). Improving nutrition security through agriculture: an analytical framework based on national food balance sheets to estimate nutritional adequacy of food supplies. *Food Security*, 7. <https://doi.org/10.1007/s12571-015-0452-y>
- Balanza, R., Garcia Lorda, P., Perez-Rodrigo, C., Aranceta, J., Bulló, M., & Salas-Salvadó, J. (2007). Trends in food availability determined by the Food and Agriculture Organization's food balance sheets in Mediterranean Europe in comparison with other European areas. *Public health nutrition*, 10, 168-76. <https://doi.org/10.1017/S1368980007246592>
- Baye, R., & Musah-Surugu, I. (2020). Trade Liberalization and Food Balance Sheet in Africa. [https://doi.org/10.1007/978-3-319-69626-3\\_80-1](https://doi.org/10.1007/978-3-319-69626-3_80-1)
- Berners-Lee, M., Kennelly, C., Watson, R., & Hewitt, C. N. (2018). Current global food production is sufficient to meet human nutritional needs in 2050 provided there is radical societal adaptation. *Science of the Anthropocene* 6, 52. <https://doi.org/10.1525/elementa.310>
- Chan-Myae, T., Rod J., Boyd S., & Ni Mhurchu, C. (2020). A review of the uses and reliability of food balance sheets in health research. *Nutrition Reviews*, 78(12), 989-1000. <https://doi.org/10.1093/nutrit/nuaa023>
- Grünberger, K. (2014). Estimating food consumption patterns by reconciling food balance sheets and household budget surveys. <http://www.fao.org/3/a-i4315e.pdf>
- Kummu, M., de Moel, H., Porkka, M., Siebert, S., Varis, O., & Ward, P. J. (2012). Lost Food, Wasted Resources: Global Food Supply Chain Losses and Their Impacts on Freshwater, Cropland, and Fertiliser Use. *Science of the Total Environment*, 438, 477-489. <https://doi.org/10.1016/j.scitotenv.2012.08.092>
- Lloyd, T., Disegna, M., & Le, H. T. (2020). National Food Consumption patterns: Converging Trends and the implications for health. *Euro Choices: agri-food and rural resources issues*. <https://doi.org/10.1111/1746-692X.12272>

- Mark, H., Houghton, L., Gibson, R., Monterrosa, E., & Kraemer, K. (2016). Estimating dietary micronutrient supply and the prevalence of inadequate intakes from national *Food Balance Sheets in the South Asia region*, 25, 368-376. <https://doi.org/10.6133/apjcn.2016.25.2.11>
- Mellor John, W. (1988). Global food balances and food security. *World Development*, 16(9), 997-1011. [https://doi.org/10.1016/0305-750X\(88\)90104-0](https://doi.org/10.1016/0305-750X(88)90104-0)
- Naska, A., Berg, M.-A., Carmen, C., Freisling, H., Gedrich, K., Gregorič, M., Kelleher, C., Leskova, E., Nelson, M., Pace, L., Winter, A.-M., Rodrigues, S., Sekula, W., Sjöstrom, M., Trygg, K., Turrini, A., Volatier, J.-L., Zajkas, G., & Trichopoulou, A. (2008). Food balance sheet and household budget survey dietary data and mortality patterns in Europe. *The British journal of nutrition*, 102, 166-71. <https://doi.org/10.1017/S000711450809466X>
- Yawson, D. (2020). Estimating virtual water and land use transfers associated with future food supply: A scalable food balance approach. *MethodsX*, 7, 100811. <https://doi.org/10.1016/j.mex.2020.100811>