

THE INVESTMENT IN THE MEAT SECTOR IN THE CONTEXT OF FOOD SECURITY IN UKRAINE

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Received 06 07 2018; accepted 18 09 2018

In the agricultural sector, it is important to identify the main directions of investment in order to ensure the food supply for the country's population. One of the most important cases in this sector is ensuring the secure supply of meat and meat products. The state has to choose the most effective tools for supporting the development of indigenous producers and the industry in this sector. The security of the country's food supply is influenced by a large amount of quantitative and qualitative factors. Interaction of these factors and the necessary state support instruments in the meat sector is unevenly treated in the researches of the scientists and varies depending on the specifics of the development of the food sector in a country. The problem of the research is to find out and evaluate the main financial demands and investment directions of the state's support programs for the support of Ukrainian meat's sector, which could help secure the state's demand for the food supply. The purpose of the research is to find out effective mechanisms for the state support and financing of the long-term projects aimed to ensuring the food security in the country. The methodology of research: analysis of research results of Ukrainian and foreign scientists and statistical information (2006–2018 m.). The information is grouped and structured to determine the forecast of meat consumption in Ukraine for 2020, the expected number of population and the determination of the missing quantities of this product in the country. The study provides a model for identifying the volume of long-term investments to ensure the food the security of the country's supply of meat, identifying the main directions of these investments. The research was based on economic analysis and synthesis models, correlation-regression analysis, mathematic modeling method, etc. The results of research demonstrate the indicators of the food security in the country and determine the adequacy of the food consumption; also the estimation of the investment need for meat production by 2020 is carried out.

Keywords: consumption adequacy indicator, development projects, fixed assets, food security, forecasting model, investment, meat and meat products.

JEL Codes: Q12, Q14.

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1. Introduction

Food security is one of the priorities of the country. Nowadays, the problem of the insufficient supply of the food products should be solved at the state level with the attraction of the funds for the implementation of developed support programmes for the domestic producers and the development of the necessary infrastructure. The food security of the country should be based on the principles of increasing of the import independence. The achievement of this is possible only with the sufficient development of the production potential of domestic enterprises that provide the population with food.

In conditions of the demand increasing for food products in the world, Ukraine as an agrarian state can receive significant foreign exchange earnings through the exports. A detailed study needs to be devoted to the determining of the scope and direction of public funding for projects aimed at supporting food security. The study of food security issues is held by many domestic and foreign scientists. Thus, Anderson (2013), Sabluk (2001), Wilkinson (2015) studied general problems of the food security. Basurkin (2011), Charles, Garnett and Godfray (2014) studied the main issues of the state and the market regulation of the food security. Erb, El-Hage et al. (2015) and Gasuha (2013) analyzed the problems of the development and financing of the agroindustrial complex as a basis for ensuring the food security. The main aspects of the development and validation of an experience-based measure of household food insecurity within and across seasons were described in studies of Frongillo and Nanama (2006). Megbowon and Mushunje (2018) researched the ways of the food security assessment among households. The issues of the measurement of diet quantity and quality dimensions of the food security were studied by Goshu, Kassa and Ketema (2013) as well as the determinants of food accessibility were concerned in the research of Masekoameng and Maliwichi (2014). The justification of the state support of the food industry which is based on the position of ensuring the level of production at the normative capacity of the domestic market level for a certain group of products was made by Chrisanov (2007) and others. The problems of the investment supporting of the food security still need to be learned.

The purpose of this work is to define the main directions of the investment projects which affect the food security of the country, specifically in the field of the implementation of the sectoral development projects which contribute to the improving of the agrarian economical sector through the forecasting of the inadequate consumption volume of meat in the country.

The subject of the study is the processes of establishing the amount of the investment resources to eliminate the existing threats to the food security of Ukraine in the field of meat production and meat products. The object of the research is a set of theoretical, methodological and practical aspects of investment support of the food security of the country.

The methodic of the work is based on the following methods: monographic – for studying and theoretical generalization of the modern scientific research on the

food security issues; comparative analysis – to compare actual population consumption of the individual product groups and existing rational consumption standards; generalization – for generation of conclusions; graphic – for a visual representation of the dynamics of indicators; statistical – for the analysis of changes in the studied indicators; modeling of the present value of the fix assets – for estimation of the required amount of the investment; forecasting methods and others.

2. Results and discussion

Integrated and rationally planned financing of the agrarian sector of the economy is not only an effective mechanism for profit, but also a guarantee of the stable development of the state and its effective functioning. The selection of investment projects aimed to the development of agriculture must be carried out taking into account the indicators of the food security of the country. The most significant of these indicators are: the adequacy of the consumption of an individual product and its availability. According to the Resolution of the Cabinet of Ministers of Ukraine named "Some issues of food security", the optimal situation is considered when the actual consumption of food by a person during the year meets the rationale norm. This means that the ratio between actual and rational consumption is equal to one (Postanova ..., 2007). Calculation of the adequacy of food consumption indicator is shown in the Table 1 below.

Analyzing the data in Table 1, one can conclude that there is an existing threat to food security of Ukraine due to insufficient supply of products such as: meat, milk, fish, eggs, fruits, berries and grapes and products of their processing. In addition, compared with 2015, the value of the food consumption sufficiency indicator in 2016 is deteriorated in such groups of products as: bread, milk, eggs, fruits, berries and grapes, as well as products of their processing.

Table 1. Determination of the food consumption adequacy indicator in Ukraine

Product type	Rational norm, kg / person / year	Actual consumption in 2016, kg / person	Indicator of consumption adequacy in 2016	Actual consumption in 2015, kg / person	Indicator of consumption adequacy in 2015
Bread and bakery products	101	101.0	1.00	103.2	1.02
Meat and meat products	80	51.4	0.64	50.9	0.64
Milk and dairy products	380	209.5	0.55	209.9	0.55
Fish and fish products	20	9.6	0.48	8.6	0.43
Eggs (pcs.)	290	267	0.92	280	0.97
Vegetables and melons	161	163.7	1.02	160.8	1.00

Product type	Rational norm, kg / person / year	Actual consumption in 2016, kg / person	Indicator of consumption adequacy in 2016	Actual consumption in 2015, kg / person	Indicator of consumption adequacy in 2015
Fruits, berries and grapes	90	49.7	0.55	50.9	0.57
Potato	124	139.8	1.13	137.5	1.11

Source: calculated using (Prokopenko, 2017) and (Zvit..., 2014).

The tendency to deterioration of the food security is inherent for many regions of the country, but in each of them the problem has certain differences. The regional peculiarities of the adequacy of the food consumption in Mykolayiv region are analyzed in the Table 2 below.

Table 2. Calculation of the food consumption adequacy indicator in Mykolaiv region

Product type	Dynamics of actual consumption, kg / person					Indicator of consumption adequacy in 2016
	2012	2013	2014	2015	2016	
Bread and bakery products	121.2	117.3	115.2	110.4	109.2	1.08
Meat and meat products	50.5	51.4	48.2	44.2	46.6	0.58
Milk and dairy products	230.2	227.2	227.2	206.8	212.6	0.56
Fish and fish products	16.2	17.1	11.5	8.8	9.8	0.49
Eggs (pcs.)	297	307	305	276	259	0.89
Vegetables and melons	196.6	201.9	188	189.9	187.2	1.16
Fruits, berries and grapes	51.6	54.9	52.6	51.1	47.6	0.53
Potato	103.2	110.5	117.8	113.8	116.4	0.94

Source: calculated using (Kovalyuk, 2017).

According to the Table 2, it can be concluded that the tendency of Mykolaiv region food security is the same to the overall trend in the country. However, significant differences are observed in better provision of the population of Mykolaiv region by bread, fish, vegetables and products of their processing. At the same time, a significant regional lagging behind the national average in terms of the food security is observed in such groups of products as meat, eggs, potatoes and products for their processing.

Analyzing the dynamics of actual consumption of food products in Mykolaiv region, it should be noted a significant reduction in the consumption of bread, milk, fish, eggs and products of their processing. At the same time, relative stability demonstrates the level of consumption of meat, vegetables, fruits, berries, grapes, potatoes and products of their processing.

The existing state of the availability of meat for the population of the country as a basic product of a consumer basket, containing essential for a full-fledged human activity of the human body nutrients is disappointing. In addition, in recent years, the indicator of the adequacy of consumption of meat and meat products remained at the stable unsatisfactory level, which indicates the need of the state regulation of the meat products market. To estimate the availability of meat and meat products by the population of Ukraine, we developed a forecast of their consumption by 2020, the results of which are presented in the Figure 1.

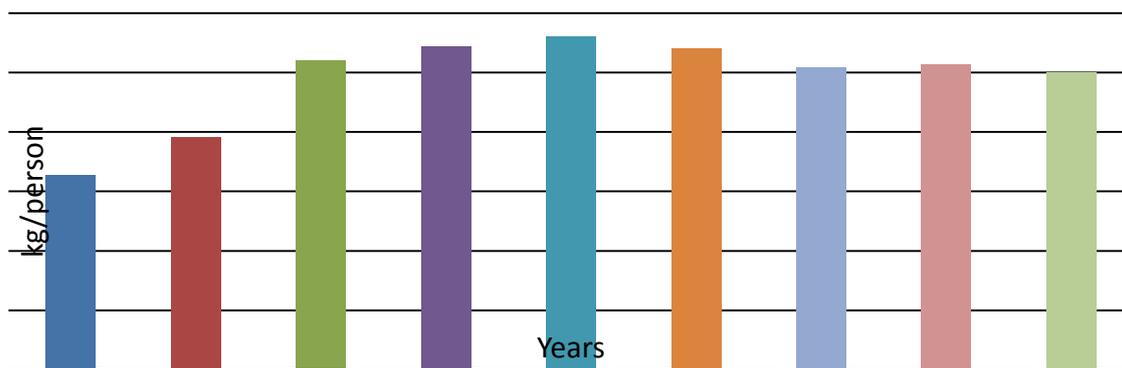


Fig. 1. Forecast of consumption of meat and meat products

Source: built using (Chysel"nist"... , 2018).

According to the developed forecast built on the polynomial model of the second degree, which is described by the trend equation ($y = -0.11x^2 + 426.1x - 4.2 \cdot 10^7$), the consumption of meat and meat products in 2020 will amount to 50.1 kg / person, which according to the current consumption rate (80 kg / person) indicates its incomplete satisfaction by 37.4 % or 29.9 kg. The reliability of the model in use is verified by determination index ($R^2 = 0.9$), which means that at least 90% of fluctuation in the forecasted level of consumption depends on the time.

Next, we used 2 schemes to determine the need for meat and meat products:

1. The first scheme allows calculating the volume of inadequate consumption of meat and meat products on a countrywide scale, using the found value of incomplete satisfaction of the needs of the population in meat and meat products per capita. After this we determined the forecast value of the population of Ukraine in 2020 (see Figure 2). The necessity of making own forecast of the population amount is quite reasonable because of the huge discrepancy between population data prognosis of United Nations (for 2015–2017 years: 44.6–44.2 million people (World...,2017)) and actual statistical information (for 2015–2017 years: 42.9–42.6 million people (Chysel"nist"... , 2018)). Also according to the UN population data prognosis 43.6 million people is predicted for 2020, but in 2018 only 42.3 million inhabitants are available and it is a strong tendency to decreasing.

2. The second scheme is based on volumes of production. Thus, deducting the forecasted volume of meat and meat products production by 2020 (see Figure 3) from

the meat and meat products consumption per capita and the forecast population of Ukraine for 2020, it can be obtained the insufficient volume of consumption of the investigated products.

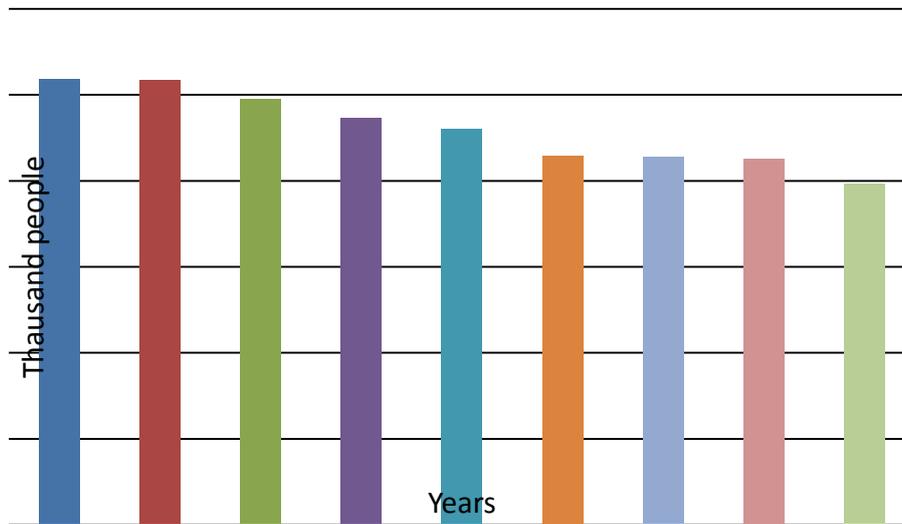


Fig. 2. Forecast of the population of Ukraine
Source: built using (Chysel"nist"... , 2018).

According to the developed forecast built on the polynomial model of the sixth degree, which is described by the trend equation), the population of Ukraine in 2020 will reach the amount of the 39600 thousand people. Taking into account that the mismatch of the forecast value of the amount of meat and meat products consumed per capita was 29.9 kg, it can be determined that the volume of insufficient consumption of meat and meat products in the country in 2020 will be $29.9 \cdot 39600000 = 1184.04$ thousand tons. The reliability of the model in use is verified by determination index ($R^2=0.99$), which means that at least 99% of fluctuation in the forecasted level of Ukrainian population depends on the time.

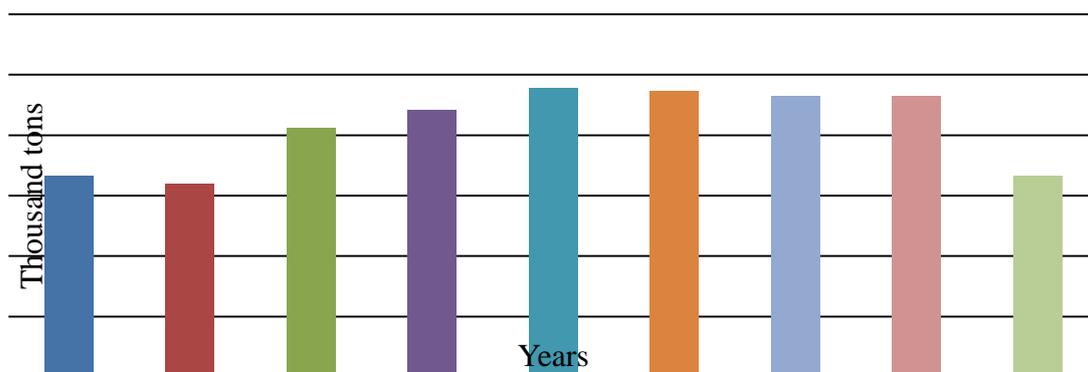


Fig. 3. Forecast of production of meat and meat products
Source: built using (Prokopenko, 2017).

According to the developed forecast based on the model of the polynomial of the third degree, which is described by the trend equation), the production of meat and meat products in 2020 will be 1660.37 thousand tons. The reliability of the model in use is verified by determination index ($R^2=0.88$), which means that at least 88% of fluctuation in the forecasted level of meat production depends on the time. Since the product of the consumption of meat and meat products per capita and the projected population of Ukraine by 2020 is equal to $80 \cdot 9600000 = 3168$ thousand tons, we will calculate the volume of inadequate consumption of milk and dairy products as $3.168 \cdot 10^3 - 1.660 \cdot 10^3 = 1.508$ million tons.

Consequently, according to the schemes, two forecasts of the insufficient consumption of meat and meat products in 2020 will be possible: more optimistic - 1184.04 thousand tons and more pessimistic - 1507.63 thousand tons. Taking into account the least favorable scenario of the development, we determined the need of the investments in meat and meat products production for 2020 in the Table 3. The rationale norm for the prospective needs of the main production facilities for the meat production in the period up to 2020 is based on data of the farm animals' productivity (Metodychni ..., 2016).

Table 3. Determination of the investment need for meat and meat products production by 2020

Production of meat per unit of animals, kg	Cost of fixed assets per 1 t of meat in live weight in 2016, thousand UAH	Discounted value of fixed assets by 2020, thousand UAH *	Needed additional amount of meat by 2020, million tons	Investment needs by 2020, UAH billions
160	138.2	287.6	1.5	433.52
180	122.9	255.6	1.5	385.35
200	110.6	230.0	1.5	346.82
220	100.5	209.1	1.5	315.29
240	921.4	191.7	1.5	289.02

Source: calculated using (Zaharchuk, Herun, Mohylova, 2016).

* the discount rate (20.1%) is taken into account from the NBU's forecast rate

Thus, according to the received calculations it can be concluded that the investment need in the field of production and processing of meat to ensure the food security of the country in this direction is from 289.02 to 433.52 billion USD. In addition, it is important to determine the directions of implementation of projects aimed to providing the population with the high quality meat and meat products.

Thus, it is possible to distinguish several investment areas to ensure the legal and organizational basis for the safety and quality of meat and meat products for the life and health of the population and the environment, specifically:

- production(to satisfy main needs of consumers in meat products at the level of science-based nutrition norms which still are not executed);

- transportation(to organize well-managed logistics in order to supply farms with all necessary kinds of feed and medicines for animals breeding; delivering of meat products to customers is also possible through this system);
- processing(to obtain products of high quality in compliance with the European standards);
- storage(to ensure quality of products and sufficiency of their reserving);
- realization(to deliver products to consumers in the most convenient way);
- import into the customs territory and export from the customs territory of Ukraine(to create the modern infrastructure for international trade).

Another important area of investment for ensuring the food security of the country and the safety and quality of meat and meat products may include some special projects for the development of the nationwide programmes on breeding and all kinds of the breeding business. In addition, the projects aimed to improving the packaging and labeling of meat and meat products also can become a promising area of the investment, in order to create the conditions for the full compliance with the requirements of the world community.

3. Conclusions

1. Food safety of the country is a significant factor that should be taken into account in the process of selecting and evaluating the effectiveness of the investment projects. In the course of the study, the existing threat to the food security of Ukraine was identified due to the insufficient supply of such groups of products as meat, milk, fish, eggs, fruits, berries and grapes and products of their processing. Currently, the problem of the insufficient supply of the food products should be solved at the state level involving the funds for the implementation of the developed support programs for the domestic producers and the development of the necessary infrastructure.

2. According to the considered schemes for determining the need of meat, two possible variants of the insufficient consumption of meat and meat products in 2020 will be possible: more optimistic – 1.2 million tons and more pessimistic – 1.5 million tons. Based on the substantiation of the promising investment need in the field of production and processing of meat to ensure the food security of the country in this direction is from 289.02 to 433.52 billion USD.

3. The sectors of production, transportation, processing, storage, sale, import of meat and meat products to the customs territory and removal from the customs territory of Ukraine of meat and meat products, as well as projects for the improvement of packaging and labeling of meat raw materials and meat products and the development of the nationwide programs on breeding and all kinds of the breeding business can be considered as the most important areas of investment.

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MĖSOS GAMYBOS INVESTICINIS RĖMIMAS UKRAINOS APRŪPINIMO MAISTU SAUGUMO UŽTIKRINIMO KONTEKSTE

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Received 2018 07 06; accepted 2018 09 18

Santrauka

Žemės ūkio sektoriuje svarbu nustatyti pagrindines investicijų kryptis, siekiant užtikrinti šalies gyventojų apsirūpinimo maistu saugumą. Vienas svarbiausių šiame sektoriuje yra apsirūpinimo mėsa ir mėsos produktais saugumo užtikrinimas. Valstybė turi pasirinkti efektyviausius vietinių gamintojų bei šiai sektoriaus šakai reikalingos infrastruktūros plėtros rėmimo instrumentus. Tyrimo problema – Ukrainos mėsos sektoriaus rėmimui reikalingos valstybės paramos ir projektų finansavimo poreikio ir svarbiausių investavimo kryptų vertinimas, kurių visuma gali užtikrinti šalies apsirūpinimo maistu saugumą. Tyrimo tikslas – nustatyti pagrindines viešojo investavimo į ilgalaikį turtą kryptis ir mastą šalies mėsos sektoriuje, užtikrinant apsirūpinimo maistu saugumą. Atlikta Ukrainos ir užsienio mokslininkų tyrimų rezultatų ir statistinės informacijos analizė (2006–2018 m.). Informacija grupuojama ir struktūrizuojama, siekiant nustatyti prognozuojamas iki 2020 m. mėsos suvartojimo apimtis, tikėtiną gyventojų skaičių Ukrainoje bei nustatant šio produkto trūkstamus kiekius šalyje. Tyrime pateiktas modelis, leidžiantis nustatyti būtiną pritraukti ilgalaikių investicijų apimtį, užtikrinant šalies apsirūpinimo mėsa saugumą, identifikuotas pagrindinės šių investicijų kryptys. Tyrimų rezultatai atspindi maisto apsirūpinimo maistu rodiklius šalyje, įvertina pagrindinių maisto produktų vartojimo pakankamumą, pagrindžia optimalias viešojo investavimo į ilgalaikį turtą mėsos sektoriuje kryptis ir būtiną apimtį.

Pagrindiniai žodžiai: investicijos, vartojimo pakankamumo rodiklis, prognozės modelis, mėsa ir mėsos produktai, ilgalaikis turtas, apsirūpinimas maistu, plėtros projektai.

JEL kodai: Q13, Q14.