

# The Strategy of Developing Agricultural Supply Chain in Terms of Food Security in Ukraine

O. Varchenko<sup>1</sup>, I. Svyinous<sup>2</sup>, Y. Grynchuk<sup>3</sup>, K. Tkachenko<sup>4</sup>, O. Shust<sup>5</sup>

*Department of management, Bila Tserkva National Agrarian University,*

*Sq. Soborna, 8/1, m. Bila Tserkva, Kyiv region, 09117, Ukraine.*

*grynchuk1979@icloud.com*

**Abstract-** The calculation of the forecasted commodity supply in terms of the main types of food in Ukraine is carried out in three variants. The normative demand for investing resources in the production of livestock products is developed on the basis of the determination of the requirements for demand in the basic, human and working capital. The necessary volume of investment production of the main types of agricultural supply chain products for the satisfaction of the country's needs in achieving food security of the country is determined. It was established that the provision of scientifically grounded needs of the population in food products requires the achievement of a balanced resource supply of the agricultural supply chain and its rational use and increasing the purchasing power of the population of the country. The regulatory requirement for investment capital for the production of livestock products has been determined with the aim of achieving a balance of resource support for production through the introduction of innovative resource-saving technologies and the modernization of industries, as well as in the development of targeted regional programs for the development of the agricultural supply chain.

**Keywords-** resource, consumption, food security, agricultural supply chain, Ukraine.

## 1. Introduction

The strategic goal of the country's agriculture development is to ensure food security, satisfaction of the population with basic food products. Leveling disproportions in the food sector is an important component of the modern economic strategy based on the priority tasks of macroeconomic stabilization and food security in Ukraine. The basis for ensuring the country's food security is the development of agro-food production, which is achieved through the accelerated introduction of innovative technologies, modernization of the material and technical base of agriculture and the food industry, as well as economic measures aimed at increasing the profitability of producers and the formation of prerequisites for economic growth. In the context of intensification of crisis phenomena in the industry, the development of measures of anti-

recessionary regulation is of paramount importance, where at the first stage it is important to ensure the balance of the components of the resource provision. It is the issue of the rational and balanced use of the resource provision of the agricultural supply chain will be considered in the article.

## Analysis of the latest research and publications

Issues of strategic priorities of developing an agricultural supply chain in Ukraine are devoted to a number of works of domestic scientists. Thus, [1] determined the basic components of the strategy of socio-economic development of agriculture in Ukraine on the basis of systematization and generalization of basic scientific approaches to the interpretation of the concept of "strategy". [2] considered the strategic priorities of the agrarian sector of Ukraine in the context of European integration, in particular, taking into account the peculiarities of the reform of the Common Agricultural supply chain Policy of the EU member states aimed at the development of rural areas. [3] Investigated the strategic priorities of agrarian policy of Ukraine in the conditions of socio-economic transformations.

Much attention of domestic scientists is also devoted to issues of food security. In particular, [4] discussed the nature, structure and features of ensuring food security of the state, which proposed to broaden the interpretation of food security to the safety of agro economic systems [5]. The researchers of the National Institute for Strategic Studies, analyzing the current state and trends of agrarian production in Ukraine, identified the main threats and indicators of food security of the state [6]. [7] made an assessment of the state of food security of the country on the basis of the use of "Methodology for determining the main indicators of food security", which was approved by the Cabinet of Ministers of Ukraine on December 5, 2007. [8] calculated the level of production and consumption of food products in the agricultural supply chain sectors development. The current state, problems and prospects of state regulation of food security were investigated by [9] and [10] loped a scenario for ensuring food security of the state. Foreign

specialists specializing in the deployment of the global food crisis, analysis of the causes of its emergence and its consequences were: [11], [12] and others. However, there is an objective need for further research into the strategic priorities of developing an agricultural supply chain in Ukraine in terms of ensuring food security of the state.

## 2. The purpose

To substantiate the strategic directions of development of domestic agricultural supply chain production focused on food provision of the country's population with the main types of food products.

## 3. Materials and Methods

To implement the goal in the scientific study, the following methods were used: statistical-economic, structural-functional, monographic, tabular, selective, comparative, computational-constructive and regression analysis.

## 4. Research results

It is known that food security is a state of food production in the country that is able to fully meet the needs of each member of society in food of appropriate quality with its balance and economic accessibility. The generalization of the scientific literature made it possible to establish that today there is a tendency to unite the problems of food security and food safety, and it makes it possible to single out a new stage in the evolution of approaches to understanding food security. So, IFPRI has used the terms "food security and food security" since the mid-1990s [13]. Today, the definition of UNICEF [14], which was also found in other scientific works earlier [16], [15], is widespread: "Food safety and food security are achieved when the food in question (by quantity, quality, safety, socio-economic status) is considered accessible to all people at any time and is appropriately consumed and assimilated to healthy and active lifestyles "[16]. So, not only stable availability and availability of food of appropriate quality (i.e. food security) is noted, but also "consumption" and the ability to absorb the necessary nutrients from food. Currently, in Ukrainian conditions, these trends are still not reflected in regulatory acts, as well as reflected in the writings of domestic researchers, which allows us to conclude that Ukraine is currently at the stage of

understanding food security, that is, the availability of food, economic and physical availability, stability and use of food, and lags behind in this regard from the world community.

The study found that in Ukraine, the problem of food security becomes particularly acute due to a number of circumstances that are caused both by global changes and deep and systemic economic crisis. As a result, the general funds for consumption of foodstuffs declined significantly, and in some years stocks of some products, as well as the decline in the purchasing power of the population. In addition, the country has developed a tendency to reorient the production resources of the crop sector enterprises to the cultivation of industrial crops: rapeseed and soybeans, and, as a result, an increase in the level of import dependence of food consumption. It is this situation that requires the justification of Ukraine's agricultural development strategies in the direction of ensuring food security. In order to characterize the country's potential to meet its own food needs, it is important to measure the volume of production and consumption of basic products, the degree of self-sufficiency of the main products, reflect the threshold values of food security and correspond to the characteristics of food security indicators. As you know, the level of the country's self-sufficiency in food is defined as the percentage of gross production of a certain product before consumption.

At the same time, for all types of products (with the exception of grain), the standard uses physiological norms for the consumption of food products, and for grain - 1 ton of grain per one resident of the country, because the grain is used not only for food production, but also for feeding animals and for delivery for export. Throughout the period under review, there is a significant excess of the level of actual production over consumption, is evidence in the current difficult economic conditions, when there is a sharp decline in the purchasing power of the population, the domestic commodity producer meets the needs of the domestic market. However, for the main types of livestock products, the level of production did not reach the threshold (80% of the rational rate). If we analyze the level of self-sufficiency based on rational consumption rates for meat products, then it is close to the threshold value solely due to the increase in the production of poultry meat. It was established that in 2016 all categories of farms produced in slaughter mass, meat of all kinds 2323.6 thousand tons, which is 1 thousand tons more than in 2015. At the same time, beef and veal meat is 375,6 thousand tons, which is 8,4 thousand tons less (2,2%) of the indicator in 2015. This phenomenon is also

observed in the production of pork, which is produced in the slaughter mass, 747.6 thousand tons of pork meat, which is 12.1 thousand tons less (1.6%).

However, in 2016, farms of all categories produced in slaughter mass, poultry meat 1166.8 thousand tons, which is 23.1 thousand tons more (2%) of the 2015 index. The growth of poultry meat production offsets the decline in pork and beef production. The consumption of meat and meat products per person per year in 2016 amounted to 51.4 kg, which is lower than the rationale (80 kg) by 28.6 kg. At the same time, compared to 2000, consumption increased by 18.6 kg. The level of consumption of meat per one person has a positive trend and in 2016 it increased by 0,5 kg, or 1%. According to the rational consumption rate (80 kg) of beef and veal, 32 kg (40%) in 2016 consumed 8.1 kg (10.1% of the norm), pork 28 kg (35%), respectively, consumed 19 kg (23.8 %), poultry meat - 20 kg (25%) consumed 23.6 kg (29.5%). A similar situation is observed in the production and consumption of milk and dairy products. Thus, in 2016, milk production in all categories of farms decreased by 233.9 thousand tons (2.2%) compared to 2015, including 270.3 thousand tons (3.4%) in households. Whereas in agricultural supply chain enterprises, on the contrary, increased by 36.4 thousand tons (1.4%). The consumption of milk and dairy products per one person per year in 2016 was 209.5 kg, with a scientifically substantiated norm - 380 kg. At the same time, the level of production of the main types of crop production significantly exceeds the normative values. The main reason for this situation is unweight state policy, led to the orientation towards the cultivation of export-oriented agricultural supply chain crops by the enterprises of the corporate sector of the agrarian economy of Ukraine. Most agricultural enterprises refused to produce livestock products because of its unprofitability and lack of effective state support. The predominance of the export of raw materials, instead of sending them to the domestic market, not only goes against the latter's capabilities, but taking into account the current situation in the country, there is a certain threat. Now on the foreign market, there is a decline in prices for grain (food and feed), sunflower, rape and soy. At the same time, there is an increase in prices for beef, pork and dairy products - production, which in Ukraine tends to decrease. One of the main factors of the difficult situation in livestock, as the industry is focused primarily on meeting the needs of the domestic market, is the decline in solvent demand from domestic consumers. This was one of the main reasons, the prices for livestock products in the first half of 2017 were lower than in 2016 (by 1.3%), and began to grow only in July

2017 (were 5% higher than in 2016). However, this is significantly less than the inflation rate, which already exceeded 16% in the annual measurement. As a result, the level of consumption of livestock products per consumer in Ukraine is significantly inferior to similar consumption in the leading countries of the world and is less than the recommended physiological norms. It is established that in 2014 the Research Department of The Economist magazine assessed the level of food security of the countries of the world, as a result of which the USA ranked first in the rating. A characteristic feature of the United States, according to the compilers of the rating, is economic sustainability, high level of incomes of the population combined with a relatively low share of household expenditure on food, highly developed agricultural supply chain and logistical infrastructure, high food diversification and economic accessibility of the population to safe and nutritious food products. Note that Ukraine in this ranking ranked 52nd position by 109 [18].

According to the results of the GFSI research in 2017, Ukraine ranks 63rd in the general rating with 54.1 points, while in terms of economic accessibility of food - 59th place with 55.7 points, if there is and sufficient - 78th place with 50.2 points, and for quality and safety of food products - 51 place from 61 points. [17], according to the results of the 2017 study, Ukraine is among the countries with average levels of economic accessibility, food sufficiency for the population and a high-quality and safe level of food for the population. At the same time, it should be noted that a general assessment of food security in our country shows a tendency to reduce it. So, in 2012. The value of this indicator was 58.5 points, and in 2017 - 54.1 points, or a decrease of 4.4 points is observed. The limiting criterion of the indicator of consumption by the population of food products and their energy value on the basis of the Law of Ukraine "On Food Safety" is 3000 kcal per day. We believe that this indicator is only declarative, since the limit (threshold) criterion is 2500 kcal per day, while 55% of the daily diet should be provided by consumption of animal products [19]. During 2014-2016 years. There is a decrease in the average daily nutritional value of the diet of the population of Ukraine. According to the statistics bodies, in 2016 the level of consumed energy of the products was 2742 kcal per day, or 57 kcal less than a year ago. Statistics show that the average Ukrainian resident tends to vegetarianism, but in most cases this is not due to life beliefs, but mostly limited financial possibilities. So, in 2016 only 29% of the average daily ration was provided due to consumption of products varinitsvetva, which is almost 2 times less than

the level necessary for a healthy diet (55%). It should be noted that nutrition is considered to be balanced, in which the ratio of the main components - proteins, fats and carbohydrates as a 1: 1: 4 ratio is respected in the daily ration. In 2016, a Ukrainian citizen consumed an average of 84 grams of protein, is one of the lowest among the EU countries and 18% less than the average level of this indicator in developed countries (103 grams per day) [20]. The calorie content of the daily diet of one person in 2016 was 2990 kcal, the content of proteins in consumed foods was 84 g, fat 135 g, carbohydrates 367 g. caloric intake decreased by 1.3%. The content of carbohydrates in consumed foodstuffs decreased by 1.9%, fat - by 0.7%, and the protein content did not change.

The solution of the issue of the country's food supply is considered in the aspect of a justified need for the main components of the resource supply of agri-food production and their rational use. As you know, the volume of production of agricultural products depends on the aggregate of production resources. Since it is difficult to take into account all the factors that affect the production of agricultural supply chain products, we choose the most influential of them to construct an empirical production function.

So, in the field of crop production - the cost of capital (K) (fixed assets, current assets), the cost of labor (L) and arable land (S). In livestock - the cost of capital (basic, current assets), the cost of labor resources expended and the number of conditional livestock and poultry [3]. We will analyze based on the neoclassical production function of Cobb-Douglas, according to the data of Ukrainian agricultural enterprises for 2003-2015.

We construct the neoclassical production function of Cobb-Douglas:

$$P = AK^\alpha * L^\beta * S^\kappa * e^\eta, \quad (1)$$

where P – income (revenue) from the sale of crop production (livestock), K – cost of capital, L – number of employees in the industry, S – area of arable land (crop production) and conditional stock (livestock), e – time; A,  $\alpha$ ,  $\beta$ ,  $\kappa$ ,  $\eta$  are parameters of the model. The process of constructing a production function was carried out in the following sequence: In the first stage, we perform the linearization of the production function and reduce it to linear form. Linearization is performed in two steps. Prologarithm for both parts of the equation:

$$\ln P = \ln a_0 + \alpha \ln K + \beta \ln L + \kappa \ln S + \eta \ln e, \quad (2)$$

Let us change the variables:

$$Y = \ln P; \quad x_1 = \ln K; \quad x_2 = \ln L; \quad x_3 = \ln S, \quad (3)$$

As a result, the nonlinear multiplicative production function reduces to the following linear:

$$y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4, \quad (4)$$

Where the following relation relates the parameters of the linear and nonlinear forms:

$$b_0 = \ln a_0, \quad b_1 = \alpha, \quad b_2 = \beta, \quad b_3 = \kappa, \quad (5)$$

At the second stage, we will construct the models of multiple linear regression and estimate the model parameters by the least squares method. As a result of the regression analysis, the following indicators are obtained: R2 is 0.992 for crop production and 0.978 for livestock, which indicates a close functional dependence of income on the types of resources under study. Fisher's calculated criteria F = 121.43 and F = 43.48 exceed the table value of Fisher's criterion F (0,05,2,26) = 3,42, that is, the regression equation is significant, therefore, the investigated dependent variable Y is described by included in the regression model variables.

Based on the obtained data, one can derive the Cobb-Douglas function:

*In plant growing:*

$$\ln(y) = -4,2998 + 0,5997 \ln(K) + 0,5816 \ln(L) + 0,1503 \ln(S) - 0,00001(e) + \varepsilon, \quad (6)$$

*in animal husbandry:*

$$\ln(y) = -5,1863 + 0,934 \ln(K) + 0,1356 \ln(L) + 0,5155 \ln(S) - 0,00002(e) + \varepsilon, \quad (7)$$

Based on the model obtained, it is possible to derive Cobb-Douglas production functions by exposure:

*In plant growing:*

$$Y = 0,013571 K^{0,5997} L^{0,5816} S^{0,1503} e^{-0,00001}, \quad (8)$$

*in animal husbandry:*

$$Y = 0,00559 K^{0,934} L^{0,1356} S^{0,5155} e^{-0,00002}. \quad (9)$$

Based on the results of the models obtained, it can be concluded that there is a growing scale effect, since the sum of the coefficients  $\alpha$ ,  $\beta$ ,  $\kappa$  exceeds 1. This indicates that under the conditions when the factors K, L, and S grow in a certain proportion, the result P increases in a larger proportion, that is, a synergistic effect takes place. As shown by the calculations, the cost of capital has a decisive impact on the result. Thus, with an increase in capital in crop production by 1%, the

proceeds from the sale of crop production will increase by 0.6%, and in livestock production - by 0.9%. Received model can be used to predict future production figures based on known or expected values of capital and labor. It is obvious that the forecasted demand for production capital can be determined on the basis of the

use of investment standards per unit of output, which will allow developing forecast scenarios of production volumes. We have justified the scenarios for the development of domestic agricultural supply chain production, aimed at providing the country's population with food products in three variants (Table 1).

Table 1. Calculation of the forecasted supply of basic types of food in Ukraine, %

Type of food	I Variant		II Variant		III Variant	
	Households	Agricultural enterprises	Households	Agricultural enterprises	Households	Agricultural enterprises
Bread and bakery products	24,3	75,7	18,4	81,6	2,8	97,2
Beef	66,4	33,6	22	78,0	14,4	85,6
Pork	56,9	43,1	45,6	54,4	27,6	72,4
Poultry meat	45,8	54,2	21,4	78,6	2,2	97,8
Milk and dairy products	60,9	39,1	39	61,0	16,1	83,9
Eggs	47,1	52,9	23,5	76,5	4,7	95,3
Vegetables and melons	89,3	10,7	83,1	16,9	26,9	73,1
Fruits, berries and grapes	88,2	11,8	81,8	18,2	53,6	46,4
Potato	98,8	1,2	58,6	41,4	32,9	67,1
Sugar	21,5	78,5	12,2	87,8	0,01	99,99
Vegetable oil of all kinds	21,2	78,8	12,5	87,5	2,4	97,6

Source: Author's own calculations.

The first option envisages the production of agricultural products to provide food for the population of the country, according to the norms provided by the consumer "basket"; the second option provides for satisfying the population's needs for food in accordance with rational physiological norms; the third option envisages the production of products to provide the population with the norms stipulated in the Strategy for the Development of Agricultural supply chain Production in Ukraine for the period up to 2025. At the same time when calculating the volume of production of basic types of food, the potential possibilities of the

commodity offer in the context of the households of the population and agricultural enterprises of various forms of management and property were considered [22]. Based on the results of the study, it was hypothesized that, given the deterioration of the social and economic situation in the country, the share of the supply of households in the structure of agri-food production increases. In accordance with the selected options, we determined the estimated volumes of production of the main types of agro-food to meet the country's need to achieve food security of the country (Table 2).

Table 2. Estimated need for production of basic types of food, thousand tons

Types of food	I Variant	II Variant	III Variant
Bread and bakery products	8625	8119	80000
Beef	709	2058	630
Pork	1839	2625	1750
Poultry meat	1360	2094	1510
Milk and dairy products	6929	20035	16000
Eggs, million pieces	9966	15764	20900
Vegetables and melons	4983	8460	18534
Fruits, berries and grapes	2899	4566	3400
Potato	4304	6853	22000
Sugar	1676	1739	17000
Vegetable oil of all kinds	531	1205	10490

Source: Author's own calculations.

Obviously, ensuring the country's food security can be achieved with the economic growth of agricultural production on the principles of sustainability, which involves modernization and updating of the material and technical base, the introduction of innovative resource-saving technologies, ensuring the expanded reproduction of productive resources, the development of the system of logistic marketing and harmonization of domestic regulatory legislation. Quality and safety of products to European requirements [17]. At the same time, we have calculated a balanced need for the components of resource provision of production in the agrarian sector of the economy. Of course, providing advanced reproduction in agriculture requires regulatory maintenance of productive capital - means of production: buildings and constructions, transmission systems of supply (electric energy, gas, water, and heat), machinery and equipment, vehicles, materials, various raw materials, energy carriers, and mineral fertilizers and other chemicals and labor resources. The purchase of which requires investment resources, the need for them can be determined on the basis of relevant cost standards, which in the current conditions have not yet been developed. In order to determine the need for investment in the production of one ton of crop and livestock production, it is advisable to develop methodological approaches to the calculation of cost standards of capital, the essence of which is that in the first place the objects for which it is necessary to develop investment standards for their formation. Such objects in crop production are agricultural crops, depending on their yield, it is expedient to calculate the investment rates per hectare of crops and landings, and on their basis to determine the investment standards for the production of one ton of agricultural products. To

calculate the investment needs for livestock industries, methodological approaches were grounded, which determined the requirements for production capital requirements per head of animals and poultry, depending on their productivity, as well as for the production of one ton of livestock products.

In calculating the regulatory requirement for investment capital in the production of livestock products, two options have been developed: optimistic - which can be realized under favorable natural and climatic conditions for the production of the basic types of agricultural products and high level of technological support; pessimistic - in the conditions of deteriorating conditions for the cultivation of farm animals and the maintenance of animals, as well as the use in the production of extensive technologies [11]. Note that the calculation of the standard will be carried out on the basis of the definition of the standards of demand in the basic, human, working capital. An important component in determining the investment standard is the norm of direct investments in fixed assets, consisting of the amount of financial resources aimed at building inactive part of fixed assets (buildings, structures, warehouses, equipment), for the acquisition of long-term biological assets (in plant growing - perennial plantations, in livestock production - working and productive livestock), as well as for the acquisition of mechanization, accounting and financial reporting methodologies and the preparation of financial statements also relate to fixed assets [20]. In accordance with the current accounting standards, in particular, GAAP 7 (Generally Accepted Accounting Principles) "Fixed assets" to assess the active and passive part of fixed assets will be at present cost, and long-term biological assets using the methodological principles

outlined in GAAP 30 "Biological Assets". Thus, on the basis of the current accounting standard, the cost per heifer of the milk production line is 67 thousand UAH - with the purchase of outsourced organizations, the cost will be 35 thousand UAH / head, sows - 4,5-5 thousand UAH / head. Practical experience of agricultural supply chain enterprises shows that when determining the value of direct investments in fixed assets in livestock, there is the notion of "cattle cost", which characterizes the cost of a place for one animal in a cattle-breeding establishment. According to the results of the research, the cost of livestock, depending on the production technologies, is: in dairy cattle - 3.5-8 thousand UAH, meat - 4.3-7.9 thousand UAH, pigs - 2.5 thousand UAH

[14], [20], [21]. We believe that this indicator is an integral reflection of the value of not only the acquired fixed assets, but the price of technology - an intangible asset that will be used in the production of a certain type of livestock products. When determining the standard of direct investment in fixed assets in dairy and beef cattle breeding, as well as pig breeding, it is advisable to take into account the biological characteristics of animals. In this regard, the norm of value in fixed assets will consist of three main components: the cost of direct investment in fixed assets, long-term biological assets, depreciation and current repairs (Table 3).

Table 3. Calculation of the fixed capital ratio in livestock production

Production	Productivity	Direct investment ratio (cost of livestock)	Norm in long-term biological assets	The standard in depreciation and current repairs	Total
<i>Optimistic variant</i>					
Milk, kg / head / year	4000	5220	36600	504,4	42324,4
Cattle, g / head / day	0,6	6340	26981	568,8	33889,8
Pig, g / head / day	0,45	2179	5500	236,3	7915,3
Poultry, g / head / day	0,03	234	-	12,7	246,7
Eggs, pieces / goal / year	300	98	-	2,2	100,2
<i>Pessimistic variant</i>					
Milk, kg / head / year	3325	6299	35690	667,2	42656,2
Cattle, g / head / day	0,45	8533	24980	646,4	34159,4
Pig, g / head / day	0,35	2313	5000	284,2	7597,2
Poultry, g / head / day	0,028	235	-	14	249
Eggs, pieces / goal / year	275	101	-	2,7	103,7

Source: Author's own calculations.

It is established that in the plant growing of the norm of direct investment in fixed assets has its own peculiarity and is determined on the basis of the norm of the value of fixed assets per 1 hectare of arable land. According to the results of the research by L. B. Hnatyshyn, it was 136997 UAH / ha of arable land for the farms of Lviv oblast [9]. In our opinion, this integral indicator reflects the level of needs of the crop production industry in fixed assets. Note that our calculations of standards are implemented only for the livestock sector, where it is necessary to take into account a more complex system of specific factors of its functioning. The norm of human capital consists of two parts: the cost of living labor and its value from the value of a single social contribution.

The following factors were taken into account in determining the level of living expenses, in particular in livestock: technological: the frequency of work, the type of feeding (dry, wet, liquid feed, feed mix), the system or method of keeping animals, the production direction, and purpose, room capacity, type equipment, etc.; natural: species, sex, age of animals, duration of winter and summer periods, productivity; organizational-zootechnical: the way of distribution of fodder, removal of manure, cleaning the premises, drinking, the duration of keeping animals, the conditions of their grazing; socio-economic: the length of the working day, the working day, the form of distribution and cooperation of labor, the rights, duties and responsibilities of

performers. Different variants of a combination of the above-mentioned factors provide for the organizational-technological variants of work performance conditions that determine excellent values of service standards [15]. The definition of the standard of living expenses is based on the above factors, which are reflected in the technological maps for the cultivation of crops and animals. At the same time, the level of the labor intensity of production processes in the production of agricultural supply chain products in both agricultural enterprises and households was taken into account. The basis of the analytical base of the survey results of the research institute was used SRI «Укрпромагро Продуктивність». The standard of working capital is based on two values: the natural indicators of their expenditure and the value at the time of the calculation. It should be noted that there are certain features of the definition of the working capital norm in livestock,

where the largest share is taken by feed. According to the data of 2014, the share of the cost of feed in the cost of meat production was: for the production of cattle - 56.1%, pigs 63.6, poultry - 66.2%. According to the results of a questionnaire survey on the cost of livestock products produced in households, this share reaches 70-75%. As you know, the cost of feed in the structure of the cost of this product is due to two factors: the level of feed costs per unit of output and their price. A general calculation of the investment standard for the production of basic livestock products is presented in Table 4. We calculated the norms of the advanced productive capital necessary for the production of one ton of livestock products (Table 5), as used in determining the amount of investment in the implementation of the program to achieve rational consumption norms, the food basket and the parameters of the strategic program.

Table 4. Calculation of investment ratios for the production of major livestock products

Production	Productivity of farm animals	Human Capital UAH / head	Working capital UAH / head	Fixed capital UAH / head	Total	Labor Costs Man-hour t	Foods as well. unit / t
Optimistic variant							
Milk, kg / head / year	4000	5178	12304,4	42324,4	59806,8	60,3	1,1
Cattle g / head / day	0,6	1772,9	4810	33889,8	40472,7	480	9,8
Pigs g / head / day	0,45	564,9	3636,5	7915,3	12116,7	175,8	5,4
Poultry, g / head / day	0,03	16,9	168,1	246,7	431,7	450	3,60
Eggs, pieces / goal / year	300	1,5	11,9	100,2	113,6	3,2	0,14
Pessimistic variant							
Milk, kg / head / year	3325	5341,7	11808,8	42656,2	59806,7	75,4	1,3
Cattle g / head / day	0,45	1418,3	4174,6	34159,4	39752,3	480	11,0
Pigs g / head / day	0,35	482,6	3589,7	7597,2	11669,5	189,2	7,5
Poultry, g / head / day	0,028	17,4	185,6	249	452	68,4	4,22
Eggs, pieces / goal / year	275	1,8	14,1	103,7	119,6	3,8	0,17

Source: Author's own calculations.

As the results of Table 5 show, in accordance with the draft strategy for the development of agricultural supply

chain production in Ukraine for the period up to 2025, the majority of livestock products will not achieve the



level of rational consumption norms, except for egg production.

Table 5. Determination of the need for investment in the production of basic livestock products under the relevant programs

Product Name	Scenario	Standard UAH / t	Rational * consumption standards		Norms * according to the parameters of the consumer basket		According to the development strategy	
			thousand tons	UAH mln	thousand tons	UAH mln	thousand tons	UAH mln
Milk	opt.	14951,7	17730	264177	6929	103242	16000	238400
	Pess.	18123,2		320913		125415		289600
Cattle Meat	opt.	184807	1805	333930	708	130980	630	116550
	Pess.	243392		438620		172040		153090
Pork Meat	opt.	73882,3	2344	172987	1839	135718	1750	129150
	Pess.	91885,8		215414		169004		160825
Poultry Meat	opt.	43170	1886	81475	1360	58752	1510	65232
	Pess.	45200		85472		61472		68252
Eggs	opt.	7973	770	6083	589	4653	1191	9409
	nec	6682		5313		4064		8218

\* Calculation of physical volumes of necessary livestock a product was based on established consumption norms (rational and minimum), total population (45.3 million people), and corresponding coefficients of conversion of processed products into physical units.

Source: Author's own calculations.

Obviously, ensuring the satisfaction of the needs of the population at the level of rational norms requires, on the one hand, balanced resource provision and its effective use, and on the other, an increase in the purchasing power of the country's population.

## 5. Conclusion

The results of the study allow us to conclude that the proposed methodology for determining the regulatory requirements of agriculture in investment resources for the production of livestock products with minor adjustments to livestock and poultry technology can be used to achieve a balance of resource support for the production process through the introduction of progressive resource-saving technologies and modernization branches in new innovative conditions, as well as in the development of targeted regional programs for the development of agriculture in the framework of food security. The standards for investment needs are to be the basis for developing tools to stimulate investment processes in individual livestock sectors, which will allow them to create the conditions for their qualitative economic growth.

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