ISSN 2228-9860 eISSN 1906-9642 CODEN: ITJEA8

International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies

http://TuEngr.com

Forecasting Scenarios of the Development of the Swine Products Market in Russia

A.G. Paptsov[1*] and E.A. Demakova[1]

[1] *Federal State Budgetary Scientific Institution "Federal Research Center of Agrarian Economy and Social Development of Rural Areas - All-Russian Research Institute of Agricultural Economics" (FSBSI FRC AESDRA VNIIESH) 35 Khoroshevskoye Hwy., Bldg. 2, Moscow, 123007, RUSSIA.*

**Corresponding author (Email: agp@vniiesh.ru).*

Paper ID: 12A8J

Volume 12 Issue 8

Received 24 March 2021
Received in revised form 19 May 2021
Accepted 01 June 2021
Available online 07 June 2021

Keywords:
Trend modeling; Swine farming; Pork forecasting; Pork market; Economic efficiency; Purchasing power; Agricultural economics; Animal husbandry.

Abstract

The development of agricultural production in Russia has been under the influence of various aggravated socio-economic situations caused by both internal risks and external threats. The technical and technological level of development of many branches of domestic agriculture, including the sub-industry of swine farming, is formed and functions under the conditions of continued sanctions from various countries of the world, changes in the ratio of exchange rate parities in foreign currency to the ruble, with simultaneous governmental support of agriculture. Based on the modeling the trends, this paper have made forecast scenarios for the pork production and consumption. Also, a comparative assessment of the cost of concentrated feed for pork production and the alternative of its sale, including export, was carried out.

Disciplinary: Agricultural Business and Marketing, Economics & Management, Agricultural and Food Economics.

Cite This Article:

Paptsov, A. G., and Demakova, E. A. (2021). Forecasting Scenarios of the Development of the Swine Products Market in Russia. *International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies, 12*(8), 12A8J, 1-11. http://TUENGR.COM/V12/12A8J.pdf DOI: 10.14456/ITJEMAST.2021.157

1 Introduction

Swine and poultry farming are the most promising livestock industries in terms of the early development of export potential and an increase in provision of the Russian population with domestically produced products; they are characterized with rapid capital turnover, which ensures high profitability and return on investment.

The development of the pork market depends on many factors that are formed under the influence of the state of domestic swine farming, functioning market and government mechanisms

of influence, as well as tendencies in the development of the world pork market and related opportunities for searching potential and developing existing channels for exporting products. At the same time, an increase in production at the domestic market can be dangerous for domestic agricultural producers, since there is high probability of domestic overproduction, which can result in market oversaturation and a fall in economic efficiency indicators for raising pigs, especially with a narrow range of export destinations capable of accepting the necessary volumes of products supplies.

2 Problem Formulation

The main aspects of functioning and development of the agri-food market, state regulation of food markets and trade of agricultural products, raw materials and food are studied by many Russian and foreign scientists and practitioners. The most significant contribution to the study of the issues of the functioning of the swine products market [15,16,17], methods of its regulation, as well as the formation of food security in modern economic conditions were introduced by a number of Russian economists [18,19,20].

The statistical base of the study includes the materials from the Food and Agriculture Organization of the United Nations (FAO), the Federal State Statistics Service (Russian Federation), and the National Union of Pig Breeders of Russia. The study involves generally accepted economic methods: economic-and-statistical, in particular the calculation of trend equations, abstract-and-logical, analytical, a graphical analysis method.

3 Analysis Results

According to the experts from the National Union of Pig Breeders, Russia will see an annual increase in production volumes in physical terms [21, 22]. First of all, this will happen due to the growing demand stimulated by the stabilization of prices for pork market products and a relatively low cost in comparison with poultry meat [23, 24].

The increase in production indicators will be achieved mainly due to an increase in the share in the structure of the largest pork producers in Russia, which will have to compensate the decrease in supply volumes due to the closure and bankruptcy of other complexes that could not meet competition in the market. Domestic production volumes will also grow due to the necessary compensation for the decrease in imports, as well as to covering the reduction in production volumes at households and private farms and a simultaneous increase in production for export deliveries.

Today, the progressive development of the meat and meat products market is difficult to ensure without the development of long-term forecasts of key industry indicators. The forecasts used in modern program-targeted methods of state regulation of the swine industry can be divided into two categories: forecasts of production volumes and indicators of its consumption. When predicting quantitative indicators of meat and meat products production, it is reasonable to use mathematical modeling of economic processes.

Table 1: Forecasting the development of the pork market (according to the annual increase in production volumes), thousand tons (based on info from [26]).

Indicators			Period			
			2021	2022	2023	2024
Increase in pork production in live weight			320	360	380	340
Increase in pork production in carcass weight			240	270	285	255
Increase in pork production in terms of meeting market, including:	Meeting growing demand	in live weight	91	103	109	97
		in carcass weight	69	77	81	73
	Compensation for decrease in supply volumes due to the closure and bankruptcy of other complexes that could not meet competition in the market	in live weight	61	69	72	65
		in carcass weight	46	51	54	49
	Compensation for decrease in imports	in live weight	15	17	18	16
		in carcass weight	11	13	14	12
	Covering the reduction in production volumes at households and private farms	in live weight	46	51	54	49
		in carcass weight	34	39	41	36
	Increase in production for export deliveries	in live weight	107	120	127	113
		in carcass weight	80	90	95	85

Table 1, the forecast of the indicators dynamics of socio-economic efficiency of functioning is a complex multi-level hierarchical system and is a basis for the development of comprehensive target programs to increase production and sale of competitive types of products, the implementation of anti-crisis measures in the agro-industrial complex.

Figure 1 presents the production of pigs for slaughtering in live weight per capita per year (a time horizon was 15 periods; a prediction period was 5 years).

After calculations, the following mathematical models were gained:

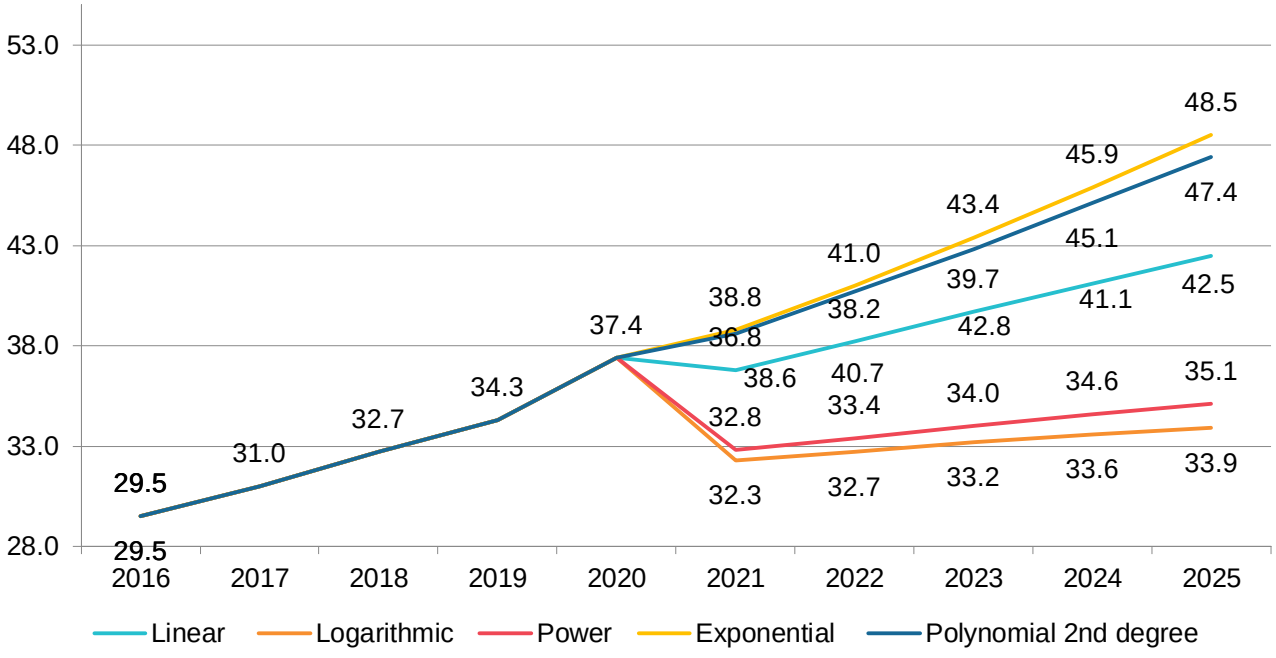
linear: y = 1.4086x + 14.298;

logarithmic: y = 5.8141ln(x) + 7.6721;

power: y = 14.089x0.3047;

exponential: y = 15.887e0.0558x;

polynomial: y = 0.0393x2 + 0.7797x + 16.08;



Linear (R^2= 0.98), Logarithmic (R^2= 0.82), Power (R^2= 0.90); Exponential (R^2= 0.99); Polynomial 2nd degree (R^2= 0.99)

Figure 1: Actual and predicted values of pork production in live weight per capita per year, kg.

The accuracy of the calculated models was checked with the coefficient of determination. As a result of calculating the linear, exponential and polynomial models, forecasts of a significant increase in the pork production per capita were gained until 2024, the coefficient of determination for these models indicates a very high accuracy of selection of the trend equation.

Using a similar methodology, a forecast of the gross production of pork in Russia was gained. After calculations, the following mathematical models were obtained:

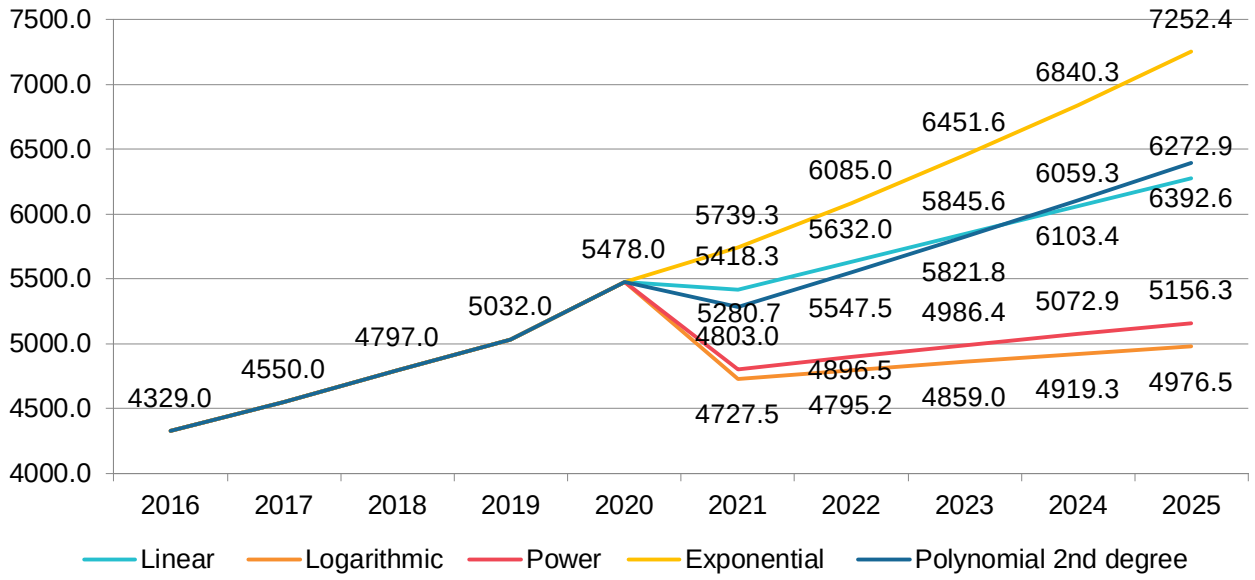
linear: y = 213.65x + 1999.9;

logarithmic: y = 1115.9ln(x) + 1633.6;

power: y = 1988.3x0.3181;

exponential: y = 2250.9e0.0585x;

polynomial: y = 6.0585x2 + 116.72x + 2274.5;



Linear (R2= 0.98), Logarithmic (R2= 0.82), Power (R2= 0.90), Exponential (R2= 0.99), Polynomial 2nd degree (R2= 0.98)

Figure 2: Actual and forecast values of pork production in Russia, thousand tons.

After calculating the trend models and extrapolation, there were forecasts indicating a stable growth in the production of swine farming, Table 2. The probability of these forecasts, according to the coefficients of determination, averages 95%.

Table 2: Forecast of pork production by federal districts of Russia

Federal districts	Period (thousand Ton)				Average annual growth rate (%)	2025 compared to 2020 (%)
	2021	2022	2023	2024		
Central federal district	3099.1	3278.7	3458.3	3637.9	39.4	130.4
Northwestern federal district	598.2	663.0	731.4	803.6	40.8	166.1
Southern federal district	421.5	485.1	558.7	642.4	42.0	210.0
Volga federal district	974.3	1038.3	1108.9	1186.2	39.6	133.6
Ural federal district	379.3	395.0	410.6	426.2	39.2	125.7
Siberian federal district	428.3	402.6	374.1	342.6	36.2	72.6
Far Eastern federal district	109.3	118.2	127.7	138.1	40.1	147.9

When carrying out the study, a forecast for the pork production by the federal districts of Russia was developed. The time horizon was 12 years, and the prediction period was 4 years. It is important to emphasize here that an increase in production volumes is forecasted almost in all federal districts, with the exception of the Siberian one.

The highest growth rates are planned for the Southern and Northwestern Districts. It is noteworthy that when predicting the pork production in the North Caucasus Federal District, there was not a single statistically significant trend model, the coefficient of determination did not exceed 0.57. In our opinion, this is a consequence of the fact that the research development in the sub-industry in this region was carried out unevenly and under the influence of a number of specific factors, in particular, religious and sociocultural.

When developing socio-economic forecasts, it is important to study not only the factors affecting the dynamics of agricultural production, but also particular changes in the market situation, which is primarily affected by the level of income of the population. Thus, it is advisable to assess the changes in the purchasing power of the wages of the population in the context of basic food products.

In 2016-2019 in the context of the outstripping growth of average per capita money income in relation to the growth of consumer prices, an increase in the purchasing power of the population was observed for almost all basic food products (Table 3).

Table 3: Purchasing power of monetary incomes of the Russian population per month, kg (Rosstat [25]).

Products	Period					2020 in % to 2016
	2016	2017	2018	2019	2020	
Beef (except boneless meat)	98.8	100.4	102.4	104.0	100.0	101.2
Pork (except boneless meat)	118.4	123.3	127.1	130.0	134.0	113.2
Mutton (except boneless meat)	89.3	93.2	91.2	86.1	83.5	93.5
Chicken refrigerated and frozen	232.9	243.0	249.1	241.2	250.1	107.4
Fish frozen (except salmon and fish fillets)	182.8	186.3	187.5	181.9	176.2	96.4
Eggs, pcs	5261	5852	5912	5797	5630	107.0
Milk, litre	541.1	516.9	530.9	536.5	518.9	95.9

In particular, there is a steady tendency in the availability of poultry and pork products. This is due to lower rates of price growth due to the constant increase in production volumes per capita. However, the consequences of the negative impact of the pandemic on the Russian economy and agriculture, in particular, resulted in a significant increase in inflation on food products and, accordingly, a decrease in the purchasing power of the population's income (Table 4).

Table 4: Dynamics of indicators of the functioning of the retail pork market.(based on Rosstat data [25])

Indicators	Period					2020 in % to 2016
	2016	2017	2018	2019	2020	
Household consumer spending. thousand rubles per year	193.0	201.2	209.9	229.9	221.1	114.6
The share of meat in the structure of consumer spending of households. %	9.2	8.8	8.6	8.3	8.7	94.6
Average household expenses on meat & meat products. thousand rubles per year	17.7	17.7	18.0	19.1	19.2	108.7
Household expenses for pork consumption. thousand rubles per year	5.84	5.85	5.95	6.29	6.35	108.7
Average consumer price of 1 kg of pork (except boneless meat). rubles	264.32	255.87	275.26	264.55	269.14	101.8
Pork consumption per capita per year. kg	22.11	22.85	21.61	23.77	23.59	106.7

An important issue in the study of swine farming and forecasting the trend of its development is the use of a marketing approach. An increase in pork production should be accompanied with an increase in domestic consumption, and when reaching full self-sufficiency with this product, there should be the export potential. Pork production over the consumption level at the domestic market inevitably results in price adjustments and a decrease in the economic efficiency of the industry. And calculations of pork consumption were carried out based on household consumption expenses, calculated according to Rosstat data.

The study showed that the annual per capita pork consumption has increased by almost 20% over the past five years, which is primarily a consequence of the increase in consumption spending in general. It is also important to emphasize that during the research period, the average consumer price of 1 kg of pork has decreased by 2.6%, which is extremely rare for food products. In our opinion, this is also a consequence of the market saturation with domestically produced products.

In order to assess the prospects for the development of the pork market in Russia, a forecast of the actual pork consumption per capita was developed (the time horizon was 15 periods, the prediction period was 5 years). It is important to emphasize here that when calculating the forecasted indicator, the dynamics of consumer spending, changes in the structure of household consumption, as well as pricing tendencies at the meat market were considered.

After calculations, the following mathematical models were obtained:

linear: $y = 0.7066x + 13.542$;

logarithmic: $y = 3.9136\ln(x) + 11.916$;

power: $y = 12.68x0.2152$;

exponential: $y = 13.972e0.0379x$;

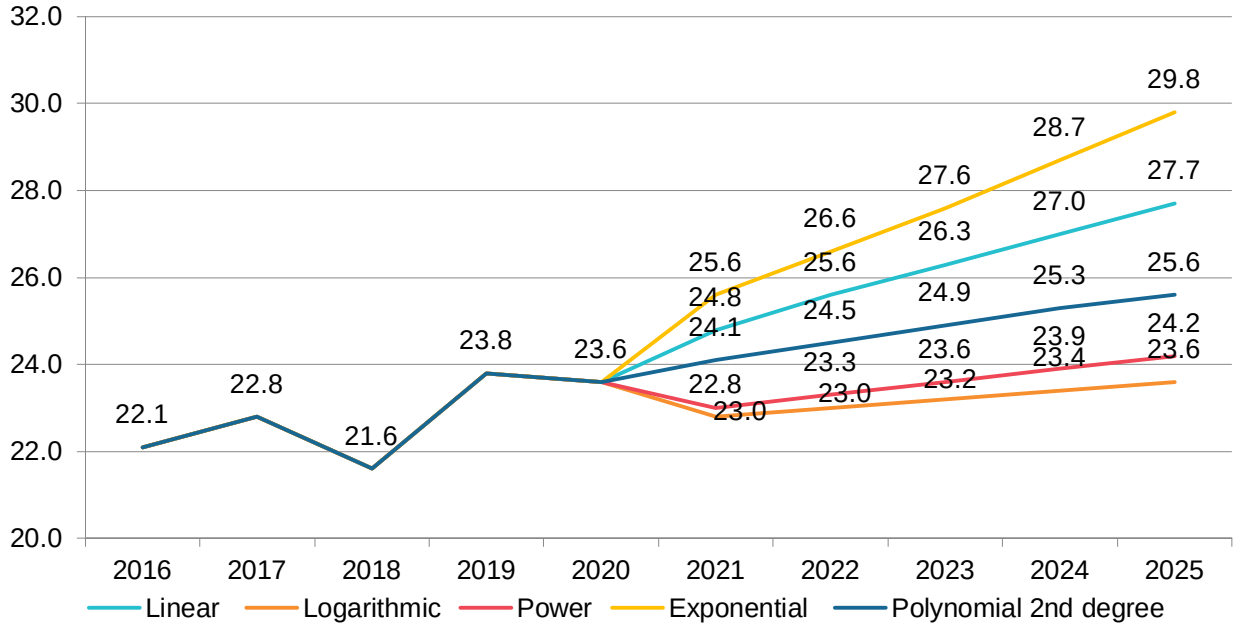
polynomial: $y = -0.0165x2 + 0.9699x + 12.796$;

Thus, the calculations showed that the most probable forecast was calculated using a polynomial trend model of the 2nd degree, which indicates an increase in the average per capita pork consumption per year up to 25.6 kg by 2025. The determination coefficient of the calculated model is 0.93. It is important to emphasize here that almost all developed models have a high degree of statistical reliability, that also demonstrates a tendency of the studied indicator to increase.

On this information basis, there is a conclusion that the volume of pork consumption in Russia will steadily grow at a fairly high rate.

It is reasonable to assess the tendencies at the market of swine products within achieving the level of full self-sufficiency, as well as further increasing production volumes according to the effectiveness of additional costs for feed resources. Thus, the author carried out a comparative assessment of the cost of concentrated feed for the pork production and alternatives of their sale, including for export. In these calculations, the applied software product "Comparative efficiency of grain export and its implementation in the production of organic meat v1.0" was used; it was developed in the department of marketing and development of food markets at the Federal State

Budgetary Scientific Institution "Federal Research Center for Agrarian Economy and Social Development of Rural Areas – All-Russian Research Institute for Agricultural Economics".



Linear (R^2= 0.92), Logarithmic (R^2= 0.86), Power (R^2= 0.90), Exponential (R^2= 0.91), Polynomial 2nd degree (R^2= 0.93)

Figure 3: Actual and forecasted values of pork consumption per capita per year, kg.

When solving the problem, the production-and-economic indicators were determined, which dynamically change in accordance with a given period of time in a calculation algorithm:

- calculation period;
- a volume of grain used as fodder resources;
- a selling price of 1 ton of grain at the domestic market and for export;
- a cost price of 1 ton of grain;
- transportation costs per 1 ton of grain;
- feed units of concentrated feed for production of 1 ton of pork in carcass weight;
- a selling price of 1 ton of meat;

The used program "Comparative efficiency of grain export and its implementation in the production of organic meat v1.0" also allows making a dynamic series of indicators of the economic effect with various initial data after predictive modeling of the grain and meat markets to predict the optimal decisions on product sales.

The results of calculating the efficiency of swine feeding at different levels of feeding intensity according to the data for 2020 are shown in Table 5.

The results allow making the following conclusion: considering the actual costs on production, transportation and export operations with grain, the cost of producing a meat unit, export-import prices, as well as the prevailing conversion of concentrated feed, it is more profitable to use grain for meat production than for export.

The situation changes with an increase in the consumption of concentrated feed for production of a meat unit and an increase in its production cost.

Concentrated feed is one of the most important components in feeding for livestock breeding, especially in such a sub-industry as swine farming. Therefore, the production cost of livestock products directly correlates with the market price of grain.

Table 5: Calculation of the comparative efficiency of grain exports and its use for pork production.

Indicators	Sale direction	
	Domestic market	Export
Selling the market grain		
Grain sales volume, thousand tons	1000	1000
Selling price, thousand rubles / tons	10224	15397
Full cost price of 1 ton of grain, rubles	7098.2	8162.93
Gross profit, thousand rubles	3125.8	7234.0
Efficiency of using grain in meat production		
Meat production as a result of the use of grain for feeding. t in carcass weight		
at a consumption of 6.5 t to 1 t of meat in carcass weight	153.8	153.8
at a consumption of 4.1 t to 1 t of meat in carcass weight	243.9	243.9
at a consumption of 3.0 t to 1 t of meat in carcass weight	333.3	333.3
Production costs at a consumption of 6.5 t per 1 t of carcass weight of meat, thousand rubles	112.87	129.80
Production costs at a consumption of 4.1 t per 1 t of carcass weight of meat, thousand rubles	71.20	81.88
Production costs at a consumption of 3.0 t per 1 t of carcass weight of meat, thousand rubles	52.09	59.91
Selling price for 1 t of carcass weight of meat, thousand rubles	90.6	174.0
Gross profit at a consumption of 6.5 t per 1 t of carcass weight of meat	-3426	6797
Gross profit at a consumption of 4.1 t per 1 t of carcass weight of meat	4733	22466
Gross profit at a consumption of 3.0 t per 1 t of carcass weight of meat	12835	38026
Loss (profit) from the sale of grain for feed (thousand rubles)		
at a consumption of 6.5 t to 1 t of carcass weight of meat	-6552.3	-436.6
at a consumption of 4.1 t to 1 t of carcass weight of meat	1606.8	15231.9
at a consumption of 3.0 t to 1 t of carcass weight of meat	9709.2	30791.6

4 Conclusion

Thus, the study has made it possible for the author to determine the main directions of development of the subindustry and formulate forecasted trajectories of development of the pork production market. When using various forecasting methods, as well as sources of information, the calculations indicate relatively similar tendencies in development of the Russian pork market. So, according to the experts from the National Union of Pig Breeders of Russia, production growth will be about 5% per year, considering the fact that large agricultural holdings will compensate the reduction of livestock at farms, which in the future will not meet competition at the market due to the constant outstripping growth in costs over the selling price.

Using trend models as a tool for forecasting economic processes, the results allow asserting that the pork production in physical terms will steadily grow both across the country as a whole and in the federal districts. It is important to clarify here that the production and consumption of pork is significantly influenced by the cultural and religious aspects of the population that live at a certain area. In particular, in the North Caucasus republics, the pork production according to trend models is not predicted, as it is impossible to choose an adequate trend model for the previous direction of the industry development. At the same time, swine farming is also actively developing

in this region, as in Russia as a whole. This sub-industry does not supply products to local markets, but it makes a large number of jobs.

When developing trend forecasts, several variants of mathematical models were used to determine the optimal directions for development of a sub-industry, in particular, a linear, power, logarithmic, exponential and polynomial model of the second degree. When forecasting the pork production by the central for the Federal districts, the most deterministic models were polynomial.

Using a similar methodology, the dynamics of the indicator of actual pork consumption per capita was calculated by the authors. This criterion is determined on the basis of the level of household consumption expenses, a share of meat in the structure of expenses, a share of pork in the structure of consumed meat, as well as average consumer prices at the retail market. For the calculation accuracy, Rosstat was chosen as the information basis as a source of statistical information. The study showed that despite a fairly high level of saturation of the domestic pork market, its per capita consumption will grow at a significant rate and will increase by 8% in 5 years.

To determine the efficiency of the use of production resources in swine farming in Russia, a method of comparative assessment of grain exports and the alternative of its selling for pork production was used. With the given prices and costs on grain and pork (conditions of 2020), the use of grain for meat production with the actual conversion of concentrated feed within the country is relatively more profitable compared to its export. At the same time, it is important to emphasize that the revealed tendency is valid only in the case of a high degree of production intensity, which is typical for large enterprises and, to a lesser extent, applies to farmers and households.

5 Availability of Data and Material

All information is included in this study.

6 References

[1] Honeyman M., Huber G., Lammers P., Hermann J. (2006). The United States pork niche market phenomenon. *Journal of Animal Science*, 84(8), 2269–2275. DOI: 10.2527/jas.2005-680

[2] Yoon, J.-Y., Brown, S. (2018). An asymmetric price transmission analysis in the U.S. pork market using threshold co-integration analysis. *Journal of Rural Development*, 41, 41-66. DOI:10.36464/jrd.2018.41.002

[3] Paptsov A., Avarskii N., Kolonchin K., Bogachev A., Seregin S., Gasanova K. (2020). Insurance as a component of the marketing mechanism to develop aquaculture, 9(26), 498-510.

[4] Pirog R., Huber G., Lammers P., Hermann J. (2006). The United States pork niche market phenomenon. *Journal of Animal Science*, 84(8).

[5] Avarskiy N.D., Bondarenko T.G., Taran V.V., Prolygina N.A., Loseva A.A. (2014). Monitoring tovaroprovodyashchey infrastruktury na rynke myasa i myasnykh produktov (Monitoring of commodity distribution infrastructure in the meat and meat products market). *APK: Ekonomika, upravleniye* 1, 27-34.

[6] Altukhov A.I. (2020). Pervoocherednyye mery po realizatsii novoy doktriny prodovol'stvennoy bezopasnosti Rossiyskoy Federatsii (Priority measures to implement the new food security doctrine of the Russian Federation). *Ekonomika sel'skogo khozyaystva Rossii*, 3, 2-10.

[7] Bespakhotnyy G.V., Korneyev A.F., Kapitonov A.A. (2016). Razvitiye mekhanizma planirovaniya dlya optimizatsii sel'khozpotentsiala regiona (Development of a planning mechanism to optimize the agricultural potential of the region). *Ekonomika, trud, upravleniye v sel'skom khozyaystve*, *3*(28), 21-24

[8] Goncharov V.D., Sal'nikov S.G. (2017). Vliyaniye dokhodov naseleniya na uroven' potrebleniya myasa i myasoproduktov (The influence of the population's income on the level of consumption of meat and meat products). *Ekonomika sel'skokhozyaystvennykh i pererabatyvayushchikh predpriyatiy*, 61-64.

[9] Zel'dner A.G. (2015). Modeli razvitiya: ot syr'yevoy k smeshannoy sotsial'no-rynochnoy (Development models: from raw materials to mixed social-market). *UEPS: upravleniye, ekonomika, politika, sotsiologiya*, 1, 3-9.

[10] Klyukach V.A., Sedova N.M., Narizhniy I.F., Demchenko A.F. (2013). Monitoring regional'nogo prodovol'stvennogo rynka: sotsial'no-ekonomicheskiye aspekty sovremennogo vzaimodeystviya yego osnovnykh sil (Monitoring of the regional food market: socio-economic aspects of modern interaction of its main forces). *Region: sistemy, ekonomika, upravleniye*, 2(21), 21-28.

[11] Krylatykh E.N., Chashcharina O.M. (2014). Prognoznyye otsenki agrarnykh rynkov EU i Rossii na period do 2022 goda (Forecast assessments of the agricultural markets of the EU and Russia for the period up to 2022). *Ekonomika sel'skokhozyaystvennykh i pererabatyvayushchikh predpriyatiy*, 7, 29-36.

[12] Osipov A.N., Hasanova H.N. (2020). Normativno-pravovoye regulirovaniye eksportnoy infrastruktury agroprodovol'stvennogo rynka (Normative legal regulation of the export infrastructure of the agri-food market). *Ekonomika, trud, upravleniye v sel'skom khozyaystve*, 11(68), 40-48.

[13] Paptsov A.G. (2015). Napravleniya obespecheniya global'noy prodovol'stvennoy bezopasnosti (Directions of ensuring global food security). *APK: Ekonomika, upravleniye*, 10, 103-107.

[14] Paptsov A.G., Akhmetshina L.G. Uchastiye (2018). Rossii v reshenii global'noy prodovol'stvennoy problemy (Russia's participation in solving the global food problem). *Ekonomika, trud, upravleniye v sel'skom khozyaystve*, 10(43), 2-6.

[15] Astratova G.V., Somin A.N., Rushchitskaya O.A. (2016). Osnovnyye perspektivy razvitiya rynka organicheskoy prodovol'stvennoy produktsii (The main prospects for development of the market of organic food products). *Vestnik Samarskogo gosudarstvennogo ekonomicheskogo universiteta*, 11(145), 46-55.

[16] Stavtsev A.N., Gasanova K.N. (2018). Analiz funktsionirovaniya rynka organicheskikh fruktov, vinograda i yagod v Yevropeyskom Soyuze i USA (Analysis of the functioning of the market of organic fruits, grapes and berries in the European Union and the USA). *Ekonomika sel'skokhozyaystvennykh i pererabatyvayushchikh predpriyatiy*, 8, 46-52.

[17] Stavtsev A.N., Natarov D.S., Porfirov P.A. (2018). Yevropeyskiy rynok organicheskogo zhivotnovodstva: sovremennyye tendentsii (The European market of organic livestock: modern tendencies). *Ekonomika, trud, upravleniye v sel'skom khozyaystve*, 12(45), 37-45.

[18] Stavtsev A.N., Gasanova KH.N., Lankin A.S., Natarov D.S. (2017). Metodika prognozirovaniya razvitiya rynka organicheskoy sel'skokhozyaystvennoy produktsii v Rossii (Methodology for forecasting the development of the market of organic agricultural products in Russia). *Ekonomika, trud, upravleniye v sel'skom khozyaystve*, 3(32), 39-49.

[19] Sokolova Z.Y., Avarskiy N.D., Taran V.V., Gasanova K.N. (2015). Aktual'nyye voprosy standartizatsii produktsii organicheskogo proizvodstva v Rossii (Topical issues of standardization of organic production in Russia). *Ekonomika sel'skokhozyaystvennykh i pererabatyvayushchikh predpriyatiy*, 6, 53-58.

[20] Ushachov I.G. (2019). Tendentsii i perspektivy razvitiya APK Rossiyskoy Federatsii (Tendencies and prospects for the development of the agro-industrial complex of the Russian Federation). *Innovatsii v APK: problemy i perspektivy*, 4(24), 113-122.

[21] MCX. (2018). National report on the progress and results of the implementation in 2019 of the State program for the development of agriculture and regulation of markets of agricultural products, raw materials and food. https://mcx.gov.ru/upload/iblock/98a/98af7d467b718 d07d5f138d4fe96eb6d.pdf Accessed 2020.

[22] Rosinformagrotekh. (2019). Food security, self-sufficiency of Russia according to the criteria of goods from the food consumer basket for the coming years. Moscow, 256. https://rosinformagrotech.ru/data/elektronnye-kopii-izdanij/normativnye-dokumenty-spravochniki-katalogi-i-dr/send/66-normativnye-dokumenty-spravochniki-katalogi/1362-prodovolstvennaya-

bezopasnostsamoobespechennost-rossii-po-kriteriyam-tovarov-iz-prodovolstvennoj-potrebitelskoj-korziny-na-blizhajshiegody-2019 Accessed 2020.

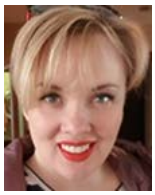
[23] Russia Government. (2013). Order of the Government of the Russian Federation of 18.11.2013 No. 2138-r "On approval of the list of indicators in the field of ensuring food security of the Russian Federation". http://government.ru/docs/all/89357 Accessed 2020.

[24] Russia Government. (2020). Decree of the President of the Russian Federation of January 21, 2020 No. 20 "On Approval of the Doctrine of Food Security of the Russian Federation". Accessed at: http://www.kremlin.ru/acts/bank/45106 Accessed 2021.

[25] Rosstat. (2020). Unified interdepartmental information and statistical system (EMISS State Statistics). http://fedstat.ru Accessed 2021.

[26] NUPBR. (2020). Russian pig data. The National Union of Pig Breeders of Russia. http://www.nssrf.ru Accessed 2021.

Professor Dr. Paptsov Andrey Gennadievich is Professor of the Academician of the Russian Academy of Sciences, Director of the Federal Scientific Center for Agrarian Economics and Social Development of Rural Areas - All-Russian Research Institute of Agricultural Economics (FGBNU FSC VNIIESH). He holds a Doctor of Economics. He was a member of the Presidium of the Russian Academy of Sciences (2017). His research interests are solving problems of the Economy and State Regulation of the Agricultural Sphere, World Agriculture, Food Security, Foreign Economic Activity, the Functioning of Food Markets in Russia and foreign countries in the context of globalization.



Demakova Elena Aleksandrovna is Head of the Sector of Economics and Agriculture of the Department of Agricultural Sciences of the Federal State Budgetary Institution "Russian Academy of Sciences". Her research interests include Food Security, Industrial and Economic Development of the Pig Breeding Industry, Improving the Organizational and Economic Mechanism.