

**BROILER MEAT PRODUCTION IN THE WORLD: VOLUMES,
TECHNOLOGIES, CURRENT STATE AND PROSPECTS**

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The dynamics of production and consumption of poultry volumes in countries with developed poultry farming was investigated, the most powerful exporters and importers of broiler meat were identified, high probability of geographical shifts in poultry farming industry and certain changes in external trade were foreseen.

Broiler industry, meat production, import and export of meat, chicken meat, poultry farming,

It is common knowledge [10], that world population has grown by 80 million in 2013 and as of January 1, 2014 has reached 7.2 billion people. It increases annually by about 1.3%. Therefore, food production should increase to at least the same pace. First of all it concerns animal protein [1,2]. If its production would grow less rapidly, then nearly 1 billion people, who currently have problems with full meals or are starving, would increase each year by millions of new. However, to meet the increasing demand for animal protein is a real challenge even for broiler industry. Its performance on the traditional strategy is associated with new farms construction and leads to decreasing the total area of agricultural land, including arable land, the need for which is growing due to the necessity of a substantial increase in the production of forage, grain – the main component of animal feed. In addition, reserve land resources, suitable for construction of new farms or increasing of arable land area, in the countries of North America and Europe (where it is focused almost 45% of world poultry production) have already been exhausted. Therefore further researchers' efforts should be directed to the development and implementation of

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new technological solutions able to ensure a significant increase in broiler meat production per unit area of existing capacities, as well as to identify regions of the world, promising to produce the product according to the modern industrial technologies.

Work objective was to investigate current condition and and further development prospects of broiler industry in different regions of the world, import-export operations volumes, identify the most efficient technological solutions enhancing the productivity of broiler enterprises without new premises construction for growing chickens for meat.

Research material and methods. In our research work we have used the statistical data of UN FAO, the Ministry of Agriculture of the United States and other countries, various sources of scientific and technical information, including materials of international scientific and practical conferences on poultry farming.

RESEARCH RESULTS. According to the UN FAO and the Ministry of Agriculture of the United States information, the sustainable growth of poultry meat production volumes, including broiler meat takes place all over the world for many years [5,8]. The leader in the production of this product, as is evidenced by the data in table 1, is America's North, Central and South parts together. The specific share of USA in the global production of poultry in 2013 was 43.6%. In comparison with 2012, chicken and broiler meat production on this continent has increased by 0.9 million. tons, that has provided its leadership by growth rates. The second place by the volume of chicken meat production (including broiler meat) during the investigated period, belongs to Asia. In 2013, this continent has produced 31.6 million tons of chicken meat that was 33.5% of its global volume. In specified rating, Europe during 2000-2014 has the third place, Africa is fourth, Oceania is fifth. Specified rating of the regions of the world (by volumes of chicken meat production in 2013) is demonstrated more clearly in Figure 1. Herewith it is still about general chicken meat production volumes on the continents of the world excluding the population. However, when determining the volumes of production and

1. Production of chicken and poultry meat in 2000-2014, million tons

Continent	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014 (Foreca sting)	+/-2013 against 2012	Growth, % (2013 against 2012)	Proportion share in 2013, %
Africa	2.8	3.3	3.4	3.7	4.0	4.2	4.5	4.6	4.7	4.8	4.9	0.1	2.1	5.1
America	27.1	32.7	33.7	35.0	37.4	36.7	38.6	39.9	40.2	41.1	42.2	0.9	2.2	43.6
Asia	18.6	22.4	23.5	25.0	26.2	28.0	29.1	29.8	31.1	31.6	32.4	0.5	1.6	33.5
Europe	9.3	10.9	10.8	11.6	12.1	13.3	13.9	14.6	15.2	15.4	15.5	0.2	1.3	16.3
Oceania	0.7	0.9	1.0	1.0	1.0	1.0	1.1	1.2	1.3	1.3	1.4	-	-	1.5
In the world:														
chicken meat,	58.5	70.2	72.3	76.2	80.6	83.3	87.2	90.0	92.5	94.2	96.4	1.7	1.8	100
including broiler meat	-	-	-	-	72.8	73.8	78.3	81.3	83.2	86.4	87.0	3.2	3.8	-

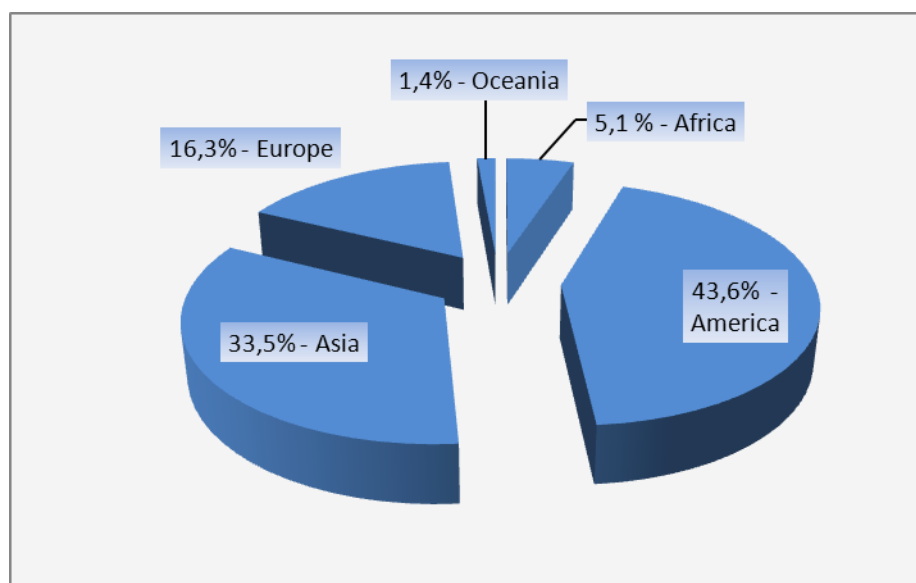


Figure 1 – Chicken meat production on the continents in 2013

consumption of chicken meat in recalculation per one ordinary resident of each continent, their rating is significantly changed. For example, in 2009 for one average resident of America (920 million) it was produced up to 39.9 kg of chicken meat, Asia (4117 million) – 6.8 kg, Europe (738 million) – 16.4 kg, Africa (999 million) – 4.2 kg, Oceania (36 million) – 27.8 kg. Therefore, in the rating by the volume of chicken meat produced for average residents in 2009, the first place belongs to America (39.9 kg), the second – Oceania (27.6 kg), the third – Europe (16.4 kg), the fourth – Asia (6.8 kg) and the fifth – Africa (4,2 kg). Regarding total volumes, then, as is evidenced by the data in table 1, the proportion share of broiler meat is 87.4-90.3% of the produced chicken meat. World broiler meat production in 2013 was 86.4 million tons. In comparison with 2008 it increased by 13.6 million tons, or by 18.7 %. The pace of this growth is graphically shown in Figure 2. In 2009, broiler meat production increased by 1.0 million tons (by 1.4%) against the previous year (2008), in 2010 - by more than 4.5 million tons (by 6.1%) against the previous year (2009). In 2011, broiler meat was produced more by 3.0 million. tons (3.8%), in 2012 – 1.9 million tons (2.3%), in 2013 – 3.2 million tons (3.8%) compared to previous years (2010, 2011 and 2012, respectively). Therefore, the annual variation of broiler meat production growth in the world was within 1.4-6.1 % [5,8]. This growth was

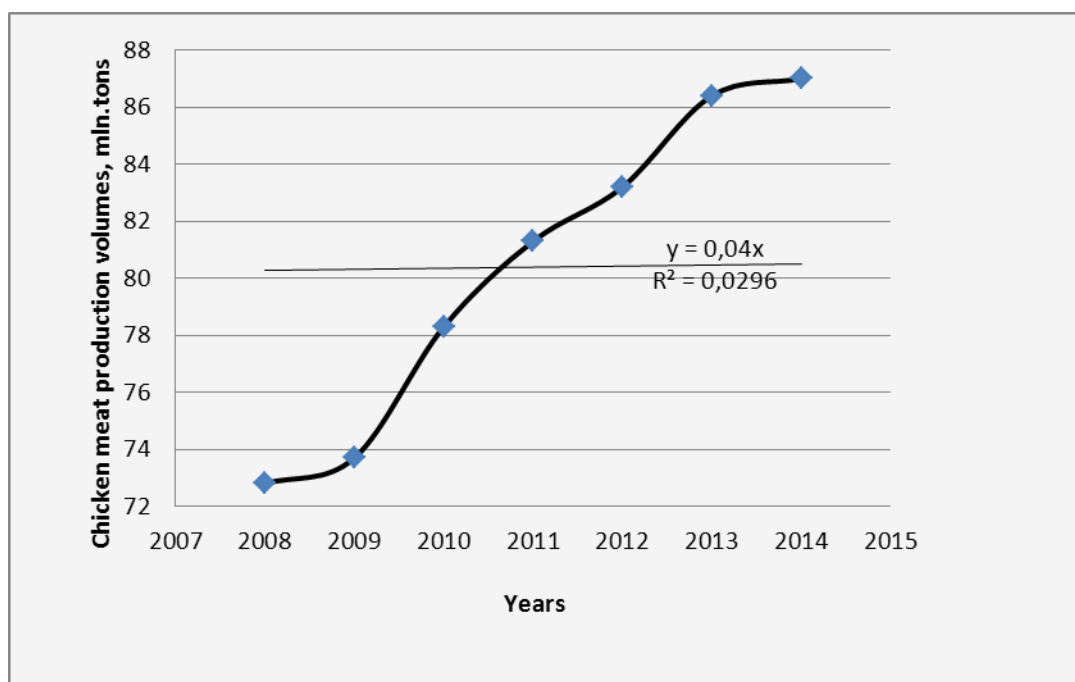


Figure 2 – Growth tendency of broiler meat production during 2008-2014

provided by increased number of enterprises of growing chickens for meat. But in 2014, the rate of broiler meat production growth is expected to be slower. In particular, it is forecasted (table 1) that it would be produced more than in 2013 just by 0.6 million tons, or by 0.7 %. Whether it is the usual cautious forecast or the signal of the exhaustion of the reserve lands for the construction of new production capacities? In any case, in our opinion, the question of more efficient technologies introduction of growing chickens for increasing broiler meat production volumes for 1 sq. m of the poultry house, reducing costs (feed, energy, labor resources, etc.) per obtained production unit and its recycling, becomes actual year by year.

Table 2 summarizes the data from the production and consumption of chicken meat in major leading countries. The absolute leader is, as can be seen from the following data [5,7], the United States, where 17.0 million tons of broiler meat was produced in 2013, or 19.7 % of its global volume. From 2009 to 2013, production of this product in the United States has increased by 1.1 million tons, i.e. the average annual growth was 275 thousand tons. Second place in this rating takes China (13.5 million tons in 2013), and Brazil is the third (12,8 million tons). Together, these three

countries in 2013 have produced 43.3 million tons of broiler meat, or the half (50.1%) of its global volume (fig. 3). Volumes of broiler meat consumption has also increased during the investigated period in almost all countries listed in table 2 [9]. In particular, its consumption in the United States has increased from 12.9 million tons in 2009 to 13.7 million tons in 2013, i.e. by 800 thousand tons (6.2%). In China for the same period (fig. 4) broiler meat consumption has increased by 1.1 million tons (9.0%), in Brazil - 600 thousand tons or 6.9 %.

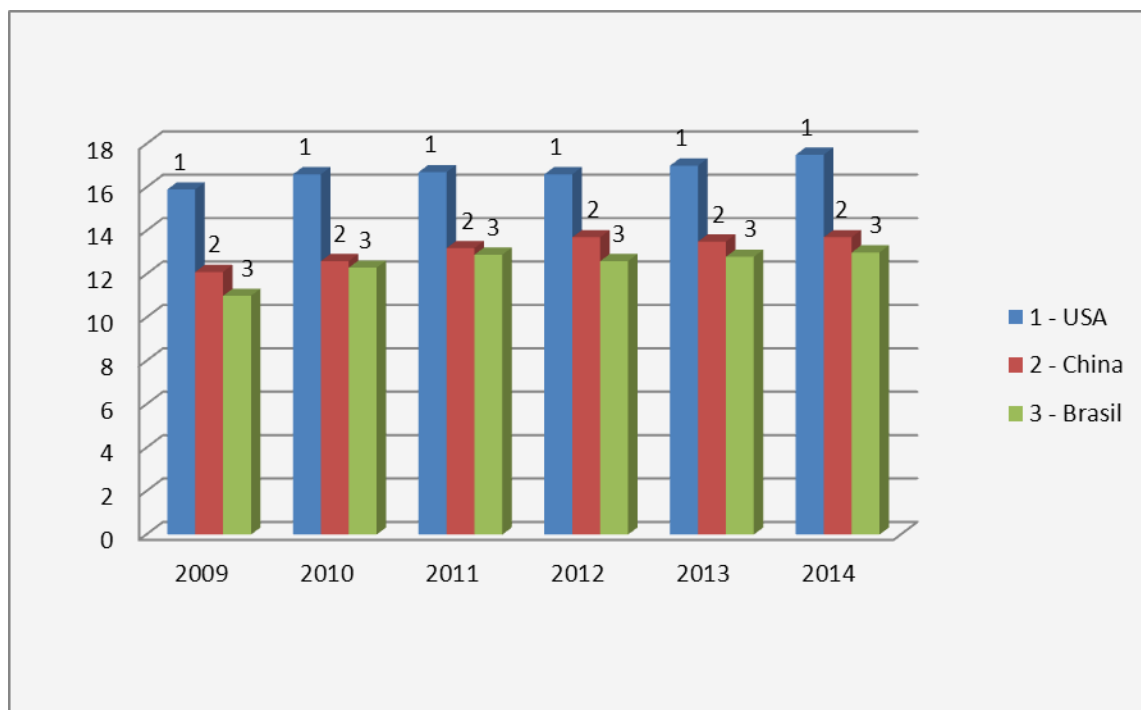


Figure 3 – Broiler meat production by three leading countries

The data on volumes of production and consumption of broiler meat in specified leading countries (United States, China, Brazil) is perceived somewhat differently in case of its recalculation per one average resident (table 3). If in 2009 and 2013 the first place in the world for general production volume (15.9 and 17.0 million tons) and broiler meat consumption (12.9 and 13.7 million tons) belonged to the United States, then after the recalculation of these volumes for one average resident it is clearly seen (table 3) that the first place actually belongs to Brazil. This country is the absolute leader, where broiler meat is manufactured (in 2009 – 57,3 kg, in 2013 – 63,1 kg) and consumed (in 2009 – 45.3 kg, in 2013 – 45.8 kg) for one

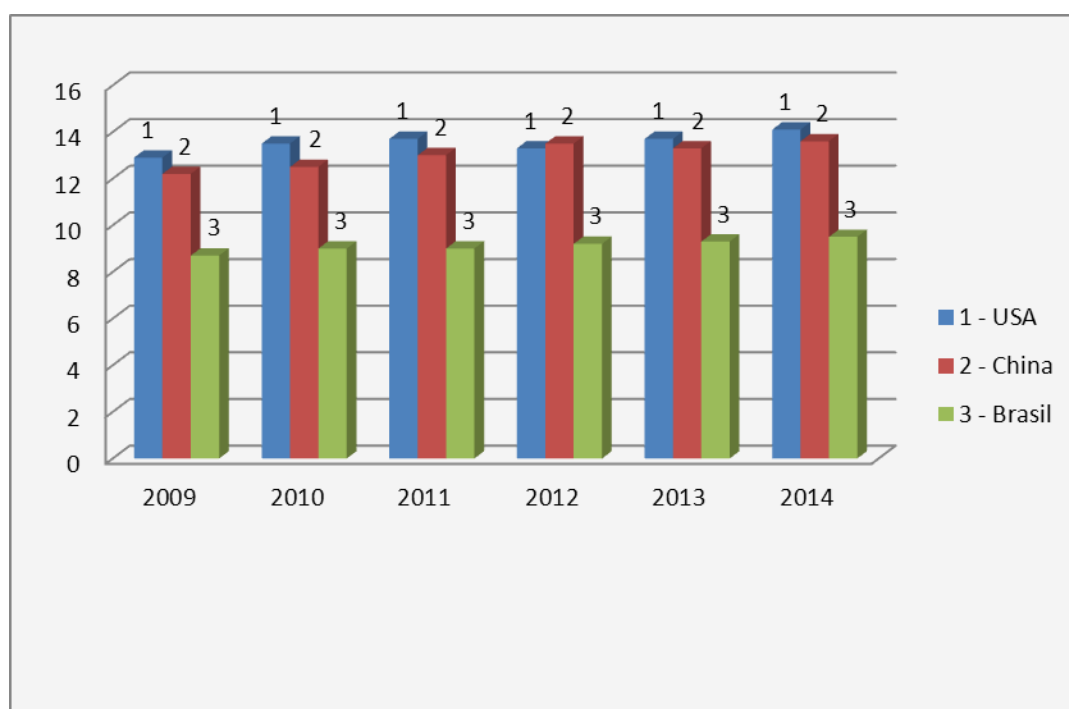


Figure 4 – Broiler meat consumption in top three leading countries

average resident more than in the United States. If China takes by the total broiler meat production the second place in the world, when it is recalculated for the average resident still produces small volumes of broiler meat, namely: 9.1 kg in 2009 and 9.9 kg – in 2013. For comparison, it should be noted that in Ukraine in 2013 for the average resident it was produced 26,9 kg of broiler meat. It should be noted that information concerning the total production and consumption of broiler meat in each country is also very important, especially when determining its export/import potential. Table 4 lists the data on exports and imports of broiler meat by leading countries and in general in the world.

As is evidenced by the data in Table 4, the largest exporters of broiler meat in the world are Brazil and United States. In particular, these two countries in 2013 have supplied into foreign market 6934 thousand tons of broiler meat that amounted 68.7 % of its world exports, and in 2014 it is expected to be no less than 65.5 %. By the way, eleven leading in export of broiler meat countries, that are shown in Table 4, in 2013 have implemented 10133 thousand tons of it (97.5 % of total exports) and the rest of the world – 260 thousand tons (2.5 %). Our country takes the eighth place in

2. Production and consumption of poultry meat in some countries of the world (million tons, the slaughter mass)

Country of	2009	2010	2011	2012	2013	2014 (Forecasting)	+/-2013 against 2012	Growth, % (2013 against 2012)
Production								
USA	15,9	16,6	16,7	16,6	17,0	17,5	0,4	2,4
China	12,1	12,6	13,2	13,7	13,5	13,7	-0,2	-1,5
Brazil	11,0	12,3	12,9	12,6	12,8	13,0	0,2	1,6
Eu Count	8,8	9,2	9,3	9,6	9,8	9,9	0,2	2,1
India	2,6	2,7	2,9	3,2	3,4	3,6	0,2	6,3
Russia	2,1	2,3	2,6	2,8	3,1	3,3	0,3	10,7
Mexico	2,8	2,8	2,9	3,0	3,0	3,0	-	-
Argentina	1,5	1,7	1,8	2,0	2,0	2,1	-	-
Turkey	1,2	1,4	1,6	1,7	1,8	1,8	0,1	5,9
Thailand	1,2	1,3	1,4	1,6	1,5	1,6	-0,1	-6,2
Indonesia	1,4	1,5	1,5	1,5	1,6	1,6	0,1	6,7
Other count	13,2	13,9	14,5	14,9	16,9	15,9	0,5	3,4
Total	73,8	78,3	81,3	83,2	86,4	87,0	3,2	3,8
Consumption								
USA	12,9	13,5	13,7	13,3	13,7	14,1	0,4	3,0
China	12,2	12,5	13,0	13,5	13,3	13,6	0,2	-4,5
Brazil	8,7	9,0	9,0	9,2	9,3	9,5	0,1	1,1
Eu Count	7,8	9,0	9,4	9,1	9,2	9,4	0,1	1,1
India	3,0	3,0	3,0	3,3	3,5	3,8	0,2	6,1
Russia	3,3	3,4	3,5	3,6	3,7	3,7	0,1	2,8
Mexico	2,5	2,6	2,9	3,2	3,4	3,6	0,2	6,3
Argentina	2,0	2,1	2,1	2,2	2,2	2,2	-	-
Turkey	1,4	1,5	1,7	1,8	1,8	1,8	-	-
Thailand	1,3	1,5	1,6	1,7	1,7	1,7	-	-
Indonesia	1,4	1,5	1,5	1,5	1,6	1,6	0,1	6,7
Other count	16,3	17,6	18,7	19,3	19,6	20,1	0,5	2,6
Total	72,8	77,2	80,1	81,7	83,0	85,1	1,3	1,6

these leading countries rating, being ahead of Canada, Lithuania and Chile. For the last 5 years Ukraine has increased its export of broiler meat from 18 thousand tons

3. Production and consumption dynamics of broiler meat in leading countries.

Country	Population, mln.	Meat produced		Meat consumed	
		Total, mln. t.	For one resident, kg	Total, mln. t.	For one resident, kg
2009					
United States	307	15.9	51.8	12.9	42.0
China	1331	12.1	9.1	12.2	9.2
Brazil	192	11.0	57.3	8.7	45.3
2013					
United States	316	17.0	53.8	13.7	43.4
China	1368	13.5	9.9	13.3	9.7
Brazil	203	12.8	63.1	9.3	45.8

(2009) to 120 thousand tons (2013), or by 566,7 %. It is foreseen that in 2014 the amount of this export would still greatly increase up to 170 thousand tons.

Japan is the leader of broiler meat imports during the investigated period. For 5 years of investigated period (2009-2013) this country has increased its import volume by 215 thousand tons, or by 33.3 %. In general, the world import volume of broiler meat has increased by 18.5 % and amounted in 2013 - 8706 thousand tons (fig. 5). Leadership by the growth rate of broiler meat imports, as is evidenced by Table 4 data, belongs to Angola (111.2 %) and the South African Republic (72.3 %). EU countries, Russia and China, by contrast, have reduced their imports during this time. For example, Russia being a world imports leader in 2009 (929 thousand tons), in 2013 has moved to sixth place (540 thousand tons) in the rating, losing to Japan, Saudi Arabia, Mexico, European Union and Iraq. This is due to the construction and introduction new poultry farms, poultry complexes and other facilities in Russia for the production of broiler meat with the traditional floor and cell technology of growing chickens [3]. The application of cell technologies allows to increase in 2-3 times broiler meat production from 1 sq. m of poultry house floor area, against floor technologies [4].

Therefore, for the investigated period the population of the Earth has risen from 6.1 (2000) to 7.2 billion (2013) people, or by 18.0 %. Production of chicken

4. The volumes of broiler meat exports and imports in 2009-2014.

Country	2009	2010	2011	2012	2013	2014 (forecasting)	+/-2013 against 2009.	Growth, % (2013 against 2009)
Exports (thousand tons)								
Brazil	3222	3272	3443	3508	3580	3625	358	11.1
United States	3093	3067	3161	3300	3354	3425	261	8.4
ES	765	934	1044	1094	1095	1105	330	43.1
Thailand	379	432	467	538	540	580	161	42.5
Turkey	86	110	206	285	365	440	279	324.4
China	291	379	423	411	415	415	124	42.6
Argentina	178	214	224	291	323	355	145	81.5
UKRAINE	18	32	43	76	120	170	102	566.7
Canada	147	147	143	140	150	155	3	2.0
Belarus	21	38	74	105	100	115	79	376.2
Chile	87	79	90	93	91	91	4	4.6
Other total	146	173	219	242	260	289	114	78.1
Total	8433	8877	9537	10083	10393	10765	1960	23.2
Imports (thousand tons)								
Japan	645	789	895	877	860	855	215	33.3
Saudi Arabia	605	681	788	799	810	825	205	33.9
Iraq	397	522	598	612	655	700	258	65.0
Mexico	492	549	578	616	675	690	183	37.2
EU	726	687	734	729	670	670	-56	92.3
Russia	929	656	463	560	540	530	-389	58.1
Angola	161	239	287	301	340	375	179	111.2
RSA	206	240	325	371	355	340	149	72.3
Venezuela	181	237	234	198	300	300	119	65.7
China	401	286	238	254	260	270	-141	64.8
United States	45	48	49	51	52	51	7	15.6
Other total	2561	2911	3100	3261	3189	3251	628	24.5
Total	7349	7845	8289	8629	8706	8857	1357	18.5

meat during this time has increased (table 1) by 61,0%, in particular from 58.5 million tons (2000) to 94.2 million tons (2013). When recalculating for one average resident of our planet, in 2000 it was produced 9.5 kg of chicken meat, and in 2013 – 13.1 kg, including 12.0 kg of broiler meat. It testifies the growth of chicken meat production (including broiler meat) with higher rates than the growth of Earth's population. Under UN FAO forecastings, the total volume of poultry meat production in the world in 2022 would reach 129 million tons, 114 million tons of which would be the chicken meat (including 103 million tons of broiler meat) and the rest (15

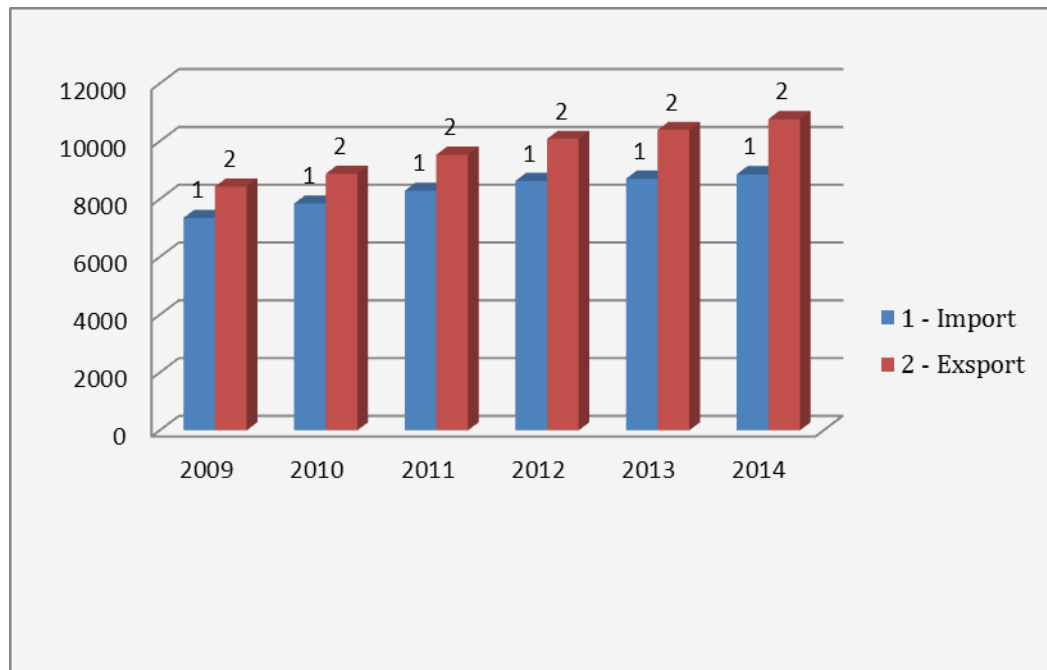


Figure 5 - Dynamics of broiler meat exports and imports in the world during 2009-2013

million tons) – ducks, geese and turkeys [5]. The population of our planet in 2022 can exceed 7.6 billion. On this basis, for each inhabitant of the planet in 2022 it would be produced 15.0 kg of chicken meat, including 13.5 kg of broiler meat. Therefore, in 8 years (from 2013 to 2022), the expected production volumes would increase by 21.0 % (or 2.6% average per year), including broiler meat - by 19.2 % (2.4% annually). The population of the planet would grow on average by 2.0 % per year. Thereby, the production of chicken meat, including broiler meat up to 2022 would grow faster than the population. But, this advance could continue only until the completion of reserve land resources, suitable for growing food grains, vegetables, fruits, forage, as well as construction of new capacities for production of chicken meat in particular. Given the fact that the specified land resources reserve in the countries of North America and Europe (where it is focused now almost 45% of world production of poultry products) is already exhausted, then, in the case of traditional technologies of growing chickens for meat using the further significant growth of chicken meat production volumes is possible only in South America, South Asia and Africa. In North America and Europe, the continued growth this product production volumes is

possible only in the case new industrial technologies implementation that provide increased in 2-3 times output of chicken meat from unit area of the poultry house.

Conclusions and prospects for further research.

Chicken meat production world volumes for the investigated period (2000-2014) are increasing much faster than the population of the Earth is growing. The proportion share of broiler meat is 87.4-90.3 % of the produced chicken meat.

America is the leader in production of chicken meat, in 2013 it has provided 43.6 % of chicken meat global volume. Among the countries of the world the leaders in producing and exporting chicken meat are the United States and Brazil, and the biggest importers are Japan, Saudi Arabia, Mexico, EU and Iraq. Further growth of broiler meat production volumes in the world would be connected with the appropriate capacities build-up in countries of South America, South Asia and Africa. Substantial increase of chicken meat production volumes in specified regions can lead to a geographic shift in the poultry farming industry, as well as to the certain changes in external trade. In particular, the export of United States and EU countries would increase the proportion share of deeply processed poultry products. US leadership in broiler meat production and export is possible in case of new industrial technologies of chickens growing implementation, that provide increased in 2-3 times output of chicken meat from unit area of the poultry house. This applies also to EU countries, which have already exhausted reserve of land resources suitable for the construction of new facilities for chickens growing for meat with the classic floor technology. Condition and prospects research of the further development of broiler industry in Ukraine is the main objective of our further experiments.

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