TRENDS IN POLISH INTERNATIONAL TRADE IN LIVE POULTRY

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Abstract
The objective of the article was to present trends in international trade in live domestic poultry in the light of the profitability of its domestic production. From the theoretical point of view, the discussed subject is extremely important in the context of the effectiveness of the market and its structures as well as for the entities which are active within it. This is valuable to the live poultry producers and processing industry of this type of meat and also to the economic policy. The study concerns the years 2004-2014 and uses annual data obtained from the Ministry of Finance and the Central Statistical Office of Poland (GUS). In the last few years there has been an increase in the positive trade balance for poultry products and a significant increase in the domestic production of poultry meat as well as a decrease in the profitability of poultry breeding (measured by the procurement price of poultry to the price of compound feedingstuffs for chicken for fattening ratio). This means that non-feedstuff cost components as well as breeding and technological advancement play an increasingly important role in the production of this type of livestock. Chicks were the dominant assortment both in the export and import of live poultry. In the years 2004-2005, 2010 Poland was a net importer of that assortment. In 2006-2009, 2011-2014, more units (birds) of live young poultry were exported than imported, which mostly resulted from a relatively high export of chicken chicks (other than laying hens). The quantitative balance of foreign trade in large live poultry was negative in the whole studied period. This was conditioned by a relatively high import of live chicken.

Keywords
poultry market, foreign trade in live poultry, poultry livestock, Poland

Introduction

The objective of this work is to assess trends visible in the foreign trade in live domestic poultry in the light of the profitability of its domestic production. From the theoretical point of view, the discussed subject is important in the context of the effectiveness of the poultry market and its structures as well as for the entities which are active within it. This is valuable not only to the producers of poultry livestock and processing industry of this type of meat, but also to the economic policy of the state.

In order to achieve the objective of the article, we used a comparative analysis in time and an analysis of the structure. The objective of this article was achieved with the use of annual data. The data was obtained from the Ministry of Finance and the Central Statistical Office of Poland. The study covers the years 2004-2014.

1. Literature review

The regions whose involve outlay with relatively low prices (feedstuff, labour, equipment, financial means) have competitive advantage on the global market. This is particularly important in the first stage of the supply chain, i.e. in livestock breeding. The cost of labour often decides on the location of product destined for export. Some countries have a surplus of cheap labour, which fosters the export of their products. Brazil is one example of such a

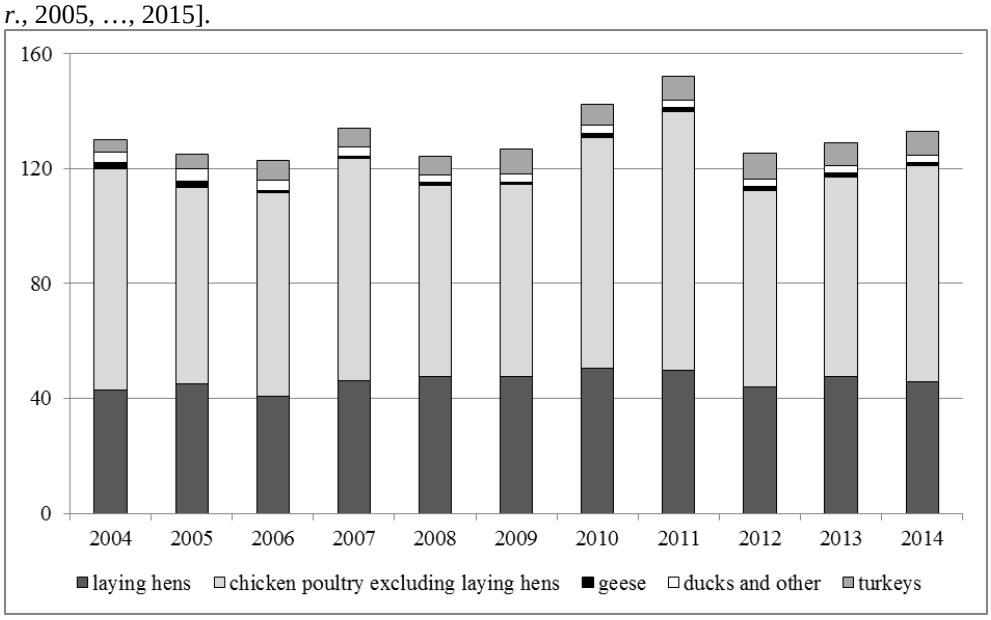
country. Its poultry production is developing dynamically thanks to large and cheap feedstuff resources and low labour costs. A high increase in export may be limited by a low veterinary and sanitary standard of such production, which is very important in the context of an increased risk of animal disease, which is more frequent in developing countries [Dybowski, Rycombel 2011, pp. 87-88].

The vast majority of poultry market research concerns the consumption and production of this type of meat, and the analysis of the economic situation of businesses from the poultry sector. The studies which are dedicated to international trade usually concern the analysis of trade in poultry products in general and meat or live poultry in general. G. Dybowski carried out an analysis of the competitiveness of the Polish poultry sector. The researcher observed that a significant part of poultry product export is sold in Member States, where competitiveness is based on a lower selling price of poultry products expressed in euro [Dybowski 2014, p. 148]. Furthermore, the research concerning geographic directions of the foreign trade in poultry products is conducted by the Institute of Agricultural and Food Economics – National Research Institute. The main goal of the research carried out by the Institute is an assessment of short-term changes on the poultry market in Poland. The results of this research are published every six months [Rynek 2004-2015]. S. Stańko conducted a research into the tendencies in production, consumption and international trade in poultry meat for the years 1990-2009. The researcher claims that the slowdown of domestic consumption of poultry meat means that the further development of this sector may depend on the situation on foreign markets [Stańko 2011, pp. 161-168]. J. Krawczyk and Z. Sokołowicz made an assessment of the influence of the growing export of poultry meat on the prices of live poultry and profitability of the production of broiler chickens based on a selected farm for the years 2001-2007. The results of this research indicate that the amount of direct surplus in semi-subsistence production depends on the size of export as much as on the procurement price of poultry [Krawczyk, Sokołowicz, 2009, pp. 192-195]. The results of A. Czyżewski and J. Danilczuk's research also confirm that Polish poultry products had a price advantage on the EU market between 2004 and 2007. According to the researchers, this advantage and favourable structure of comparative advantage indices do not exempt poultry producers and processors from continuous monitoring of the market environment, as e.g. the increase in the remuneration of the population may change other indicators of the sector's competitiveness. Moreover, non-price competing instruments are also important [Czyżewski, Danilczuk 2008, pp. 56-61]. J. Drożdż, R. Mroczek, M. Tereszczuk and R. Urban also carried out research into international competitiveness. The study concerned the years 1997-2012. The researchers claim that Poland had a strong competitive position in poultry products in general (meat, live poultry, offal, processing products and fat in total) [Drożdż, Mroczek, Tereszczuk, Urban, 2013, p. 55]. All of the mentioned scientific works lack an analysis of the scale of Polish international trade in live poultry allowing for individual species.

2. Poultry market in the light of the profitability of its breeding.

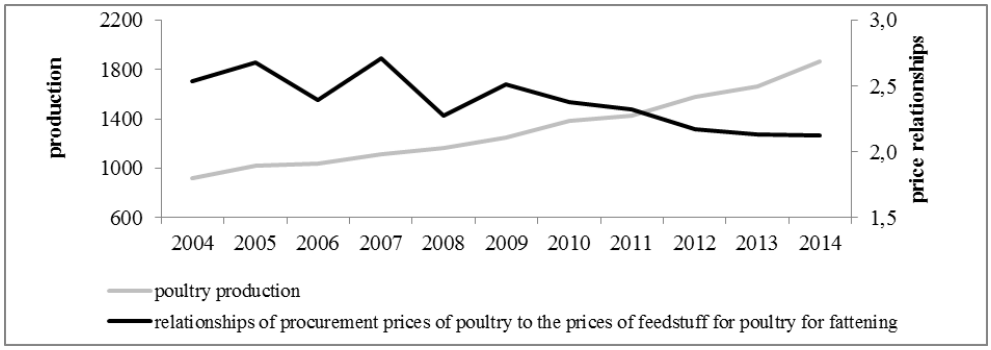
After Poland's accession to the EU the stock of poultry in Poland increased by 2% to 133 million heads (birds) (see fig. 1). This was a resultant of a 6% increase in the stock of laying hens, 85% increase for turkeys and a 48% decrease in the stock of geese, 29% for ducks and other and 2% for chicken poultry excluding laying hens (according to the state from the end of 2004 and 2014). In that period the species structure of the stock changed insignificantly. The share of laying hens increased by 1 percentage point (to 34%), turkeys by 3 percentage points (to 6%) and the percentage of both geese and ducks (and other poultry) fell by 1 percentage point (to 1% and 2% respectively); the percentage of chicken poultry excluding laying hens decreased by 2 percentage points, i.e. to 57%. Despite a slight increase in the

poultry stock (by 2% only), the production of poultry livestock increased more than twice in that period. This resulted from such factors as the increase in the number of production cycles per annum, improvement of broiler dressing percentage [Rzeszutko 2014, p. 185] and an increase in the average live weight of a slaughtered piece of chicken broilers (by 11%), ducks (by 5%), geese (by 1%) and turkeys (by 3%) [*Zwierzęta gospodarskie w 2004 r., (...) w 2014 r.*, 2005, …, 2015].



Source: own work based on: *Zwierzęta gospodarskie w 2004 r., (…) w 2014 r.*, Główny Urząd Statystyczny, Warszawa 2005, …, 2015.

Fig. 1 Poultry stock in Poland between 2004 and 2014 (at the end of the year) (in million heads)



Source: own work based on GUS (Central Statistical Office) data, *Rolnictwo w 2004 r., (…) w 2014 r.*, Główny Urząd Statystyczny, Warszawa 2005, …, 2015.

Fig. 2 Production of poultry in post-slaughter weight (in thousand tonnes) and the procurement price of poultry to the price of feedingstuffs for chicken for fattening ratio

The price of poultry purchase to the price of feed for chicken for fattening ratios were much more favourable after joining the EU, especially between 2004-2007, than between 2008-2014 (see fig. 2). The profitability of poultry livestock production in the pre-accession period was better than after joining the EU [Dybowski 2014, p. 141]. Despite the deterioration of the profitability of poultry breeding, there was an upturn in the production of poultry in Poland. G. Dybowski believes that the poultry purchase price to feed price ratio influenced the profitability of breeding less than it had done before. This is a result of a breeding and technological advancement in the production of this livestock. Moreover, non-fodder components of breeding costs are more significant, especially the cost of energy, veterinary care, the cost of meeting various requirements associated with the welfare of animals and financial burden resulting from operating loans. Another aspect consists in the changing business relations between breeders of live poultry and industrial slaughterhouses; the outwork system, which contributes to a decrease in the cost of purchasing chicks and feed on credit by producers, is playing an increasingly important role [Dybowski 2014, p. 141].

3. International trade in live poultry

The dominating trend in the export and import of live poultry in the studied period was upward (see table 1). The export of live poultry nearly tripled to 77 million units (birds) in 2014 and the import more than tripled reaching 92 million pcs. The percentage of live poultry export in the overall export of poultry products fluctuated between 1 % and 3% and the share of live poultry import in the overall import of poultry products increased from 3% in 2004 to 66% in 2014.

Table 1 International trade in poultry products[1]

Content	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
export of poultry products (in thousand tonnes)	129	187	224	260	305	350	457	493	591	669	804
export of live poultry (in million units)	26	35	42	45	42	62	51	48	73	84	77
dynamics of export of live poultry (previous year = 100) in %	-	135	121	107	93	148	82	95	150	116	92
share of live poultry export in the export of poultry products in %	1	1	1	1	1	3	3	2	3	3	3
share of chick export in total live poultry export in %	99	98	100	100	99	98	92	98	98	98	97
import of poultry products (in thousand tonnes)	88	87	92	100	71	76	85	100	105	121	136

[1] Due to perform calculations shares for data that is not rounded, in some cases, shares of ingredients may vary slightly from these values. Dynamic indexes were also calculated for data not-rounded up to the thousand or the million. Note applies to both tables and text of the article.

Content	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
import of live poultry (in million units)	30	44	45	54	49	54	61	59	65	75	92
dynamics of live poultry import in % (previous year = 100)	-	147	102	120	92	110	113	97	111	114	123
share of live poultry import in the import of poultry products in %	3	15	20	37	43	41	52	58	50	59	66
share of chick import in total live poultry import in %	97	89	78	79	81	82	77	68	70	64	68
net trade in poultry products (in thousand tonnes)	41	100	131	160	234	274	372	392	487	548	668
quantitative net trade in live poultry (in million units)	-4	-8	-2	-8	-7	8	-10	-11	7	10	-14

Source: own work based on the Ministry of Finance data.

The structure of goods in poultry livestock export and import was diverse (see table 1). The exported and imported live poultry were mainly small (weighing 185 g or less). The share of chicks in the export of poultry livestock in the studied period was diversified and it fluctuated between 92% and 100%, and the percentage of the import of smaller birds in the total live poultry import exceeded 64% nearly in the whole studied period.

3.1 International trade in chicks

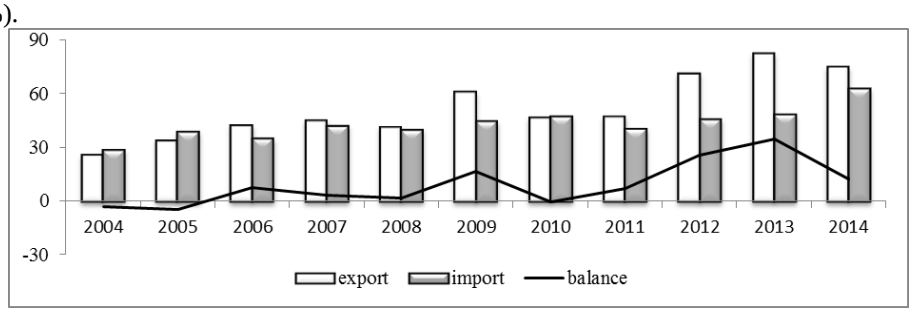
The (total) export and import of chicks (weighing 185 g or less) was small, especially in relation to the number of hatched chicks in Poland (for example in Poland in 2014 chicks hatched about 1 billion units) [*Zwierzęta gospodarskie w 2004 r., (...) w 2014 r.*, 2005, …, 2015]. The dominating trend in the export and import in the studied period was positive. The number of exported chicks nearly tripled (from 25.8 million pcs. in 2004 to 75.1 million pcs. in 2014) and the number of imported birds more than doubled (from 28.8 million pcs. in 2004 to 62.8 million pcs. in 2014) (see fig. 3). The geographic directions of poultry export and import were diversified. Chicks were exported mainly to the CIS and imported mostly from the EU. The majority of the purchasers of chicks exported from Poland were Ukraine and Belarus, and the major suppliers of this assortment to Poland were Czech Republic, Germany, Denmark, France and the Netherlands. In 2004-2005, 2010 Poland was an net importer of chicks and in 2006 it became a net exporter of this assortment and maintained this position until 2009 and in period 2011-2014.

Table 2 Species structure in chick export and import (in %) and quantitative foreign trade balance based on separate species of chicks

Content	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Species structure in export											
hen – laying	1	2	3	2	1	1	3	3	1	1	1
other chicken chicks	95	94	93	93	95	95	90	90	94	94	92
turkeys	4	4	4	4	5	4	7	7	5	5	5
geese	0	0	0	0	0	0	0	0	0	0	0
ducks and guineafowl	0	0	0	0	0	0	0	0	0	0	2
Species structure in import											
hen - laying	6	6	9	11	6	3	3	6	6	6	6
other chicken chicks	48	56	54	56	58	65	62	52	53	47	50
turkeys	40	30	33	29	29	23	24	32	28	25	22
geese	0	0	0	0	0	0	0	0	0	0	0
ducks and guineafowl	6	7	4	5	7	9	11	10	13	21	22
Balance (in million units/heads)											
hen chick – laying	-1	-2	-2	-3	-2	-1	0	-1	-2	-2	-3
other chicken chicks	11	10	21	19	16	29	13	22	43	55	38
turkeys	-11	-11	-10	-10	-10	-8	-8	-10	-9	-8	-10
geese	0	0	0	0	0	0	0	0	0	0	0
ducks and guineafowl	-2	-3	-1	-2	-3	-4	-5	-4	-6	-10	-12

Source: own work based on the Ministry of Finance data.

The species structure in chick export and import was diverse (see table 2). The dominant assortment in the total export of chicks was chicken chicks (other than laying hens) (over 89%). The total percentage of the remaining species did not exceed 11%. The share of goose chicks was small (almost zero), similarly to duck and guineafowl chicks (their percentage was the highest in 2014 – approx. 2%, whereas in previous years it was near to zero), turkey chicks (the percentage fluctuated between 4% and 7%) and laying hen chicks (from 1% to 3%).



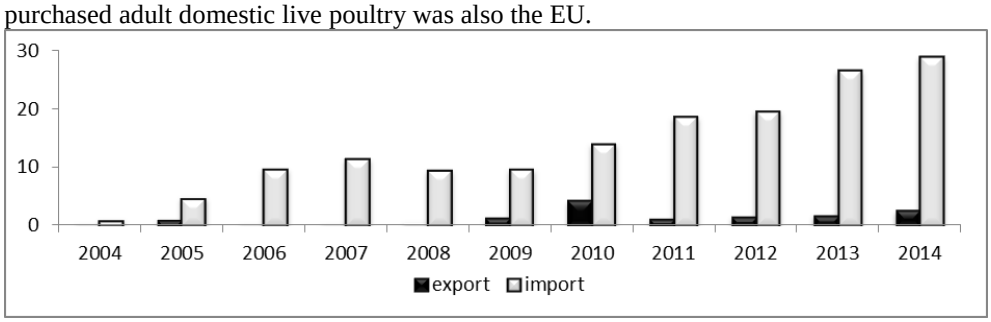
Source: own work based on the Ministry of Finance data.

Fig. 3 International trade in chicks (mln units (heads)) (weighing 185 g and less)

In the studied period the species structure in chick import was different from the species structure in the export of smaller pieces. Moreover, this structure was not stable (see table 2). The percentage of other chicken chicks (without laying hen) in the total import of chicks increased from 48% in 2004 to 50% in 2014 and the percentage of duck and guineafowl chicks grew from 6% to 22%. The increase in the total share of chicken, duck and guineafowl chicks was correlated with the fall in the share of turkey chicks from 40% to 22%. The percentage of laying hen chicks was the same in 2004 and 2014, although in the studied period it fluctuated between 3% and 11%. Goose chicks played a small role in import (percentage near or equal to zero).
Between 2004-2014 the quantitative balance of international trade in turkey, duck and guineafowl chicks as well as laying hen chicks was negative, whereas the trade balance of chicken chicks (other than laying hen chicks) was positive, which resulted from relatively high export of chicks to the Commonwealth of Independent States. The import of turkey chicks in the studied period was relatively high especially in relation to the number of slaughtered turkeys in Poland [*Zwierzęta gospodarskie w 2004 r., (...) w 2014 r.,* 2005, …, 2015]. The number of the imported turkey chicks in 2014 was 14 million pcs. and the number of slaughtered turkeys was 29.7 million pcs [*Zwierzęta gospodarskie w 2014 r.*, 2015, p. 125]. Thus, it seems important to identify the reasons for such a situation in the context of the profitability of an increase in the country's offer of this species of chicks. Moreover, in the last few years the fall in the stock of ducks was accompanied by a deepening negative quantitative balance of trade in duck chicks. The growing import of duck chicks may be fostered by a trend consisting in consuming poultry other than chicken meat. Commercial networks and restaurants have been expanding their offer of this type of meat lately, due to high interest of the consumers. This phenomenon is also fostered by the increase in the wealth of the Polish society (poultry meat other than chicken meat is usually more expensive).

3.2 International trade in large poultry livestock

The number of exported of large live poultry (over 185 g) was much smaller than the number of imported of the same assortment. Between 2004 and 2014, the number of exported larger units of livestock grew more than 16-fold (from 0.2 million units in 2004 to 2.4 million units in 2014) and the number of imported poultry increased more than 33-fold (from 0.9 million units in 2004 to 29 million units in 2014) (see fig. 4). As a result, the negative quantitative net trade in this assortment deepened (to 26.6 units million in 2014). Large poultry was exported from Poland mostly to Member States. The dominant market on which Poland purchased adult domestic live poultry was also the EU.



Source: own work based on the Ministry of Finance data.

Fig. 4 International trade in large live poultry (weighting over 185 g) (in million units)

Table 3 Species structure in export and import of large live poultry (in %) and quantitative foreign trade balance for individual species of large live poultry (over 185 g)

Content	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Species structure in export											
chickens	83	99	100	49	0	61	85	47	16	6	27
ducks	0	0	0	0	0	0	0	0	0	0	0
geese	0	0	0	0	1	0	0	0	0	0	0
turkeys	17	1	0	51	99	38	15	53	84	94	73
guineafowl	0	0	0	0	0	0	0	0	0	0	0
Species structure in import											
chickens	97	97	91	90	89	94	96	95	95	93	87
ducks	0	0	0	0	0	0	0	0	0	1	4
geese	0	0	0	0	0	0	0	0	0	1	1
turkeys	3	3	9	10	10	6	4	5	4	6	8
guineafowl	0	0	0	0	1	0	0	0	0	0	0
Balance (in million units (heads))											
chickens	-0.7	-3.8	-8.7	-10.2	-8.4	-8.2	-9.9	-17.3	-18.5	-24.6	-24.5
ducks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-1.3
geese	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.4
turkeys	0.0	-0.1	-0.8	-1.2	-0.5	-0.1	0.0	-0.3	0.3	0.1	-0.4
guineafowl	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0

Source: own work based on the Ministry of Finance data.

In the studied period, the species structure of the export of larger birds was varied. The dominant position in export of live poultry was held by live chickens or live turkeys. Guineafowl, geese and ducks played insignificant role in export (their joint percentage was close or equal to zero).

Between 2004 and 2014 there were small changes in the species structure in the import of mature livestock (see table 3). The percentage of ducks in the import of large live poultry increased from 0% in 2004 to 4% in 2014, geese – from 0% to 1%, turkeys – from 3% to 8%, and the percentage of chickens fell by 10 percentage point to 87%. The highest percentage of imported guineafowl was in 2007 (approx. 1%) and it was close to zero in the remaining years.

The quantitative balance of international trade in live large chickens was negative in the whole studied period. Thus, it seems important to identify the reasons for such a situation in the context of the profitability of an increase in the country's offer of this species of livestock. The remaining quantitative balances of foreign trade in mature live poultry (ducks, geese, turkeys and guineafowl) were differentiated.

3.3 International competitiveness of poultry products

The index used to evaluate the competitiveness of Poland on the international poultry product market was the coverage ratio (CR) or trade coverage (TC) calculated according to the following formula:

$$CR = \frac{X_k}{M_k}$$

X_k - country export *k*,

M_k - country import *k* [Lubiński, Michalski, Misala 1995].

The analysis of the data from table 4 allows us to observe that the revenue obtained from the export of total poultry products in the whole studied period exceeded expenditure on the import of that product group. For the whole studied period, the coverage ratio calculated for live poultry in total was less than 67%, which may signify the country's lack of specialisation in this product group. Similar results were obtained for total chicks and total large live poultry (over 185 g). However, the analysis of the coverage ratio for individual species of chicks and large pieces shows that the measure assumed values higher than 100% in the years 2006-2009, 2011-2014 for the remaining chicken chicks (apart from laying hen chicks), in 2007 for goose chicks and in 2010 and 2012-2014 for large turkeys (weighing over 185 g), which meant that the country could specialize in the mentioned assortments in these years.
Other commonly used competitiveness evaluation ratios are: import penetration ratio (MP) and export specialisation index (EO). The former has been calculated according to the following formula:

$$MP = \frac{M}{Q - X + M}$$

Where:

M - import,

X - export,

Q - production [Jagiełło 2003, Nosecka, Bugała, Zaremba, Brzozowski, Zmarlicki 2013, p. 34].

The latter (EO) has been calculated based on the following formula:

$$EO = \frac{X}{Q}$$

X - export,

Q - production [Seremak-Bulge 2011, pp. 8-9, 7, Nosecka, Bugała, Zaremba, Brzozowski, Zmarlicki 2013, p. 33].

Table 4 Formation of the selected ratios of international competitiveness (in %)

Content	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
EO for poultry products	16	21	24	26	28	30	35	37	40	44	47
MP for poultry products	10	10	10	10	7	7	7	8	8	9	10
CR for poultry products	301	404	441	497	622	586	653	678	782	711	714
CR for total	36	40	38	29	36	59	46	39	58	67	48
CR – chicks											
total chicks	36	44	62	57	54	68	54	58	71	89	61
hen chicks – laying	11	49	75	42	10	8	19	7	4	15	30
other chicken chicks	83	91	131	129	113	135	98	127	162	216	126
turkeys	14	13	17	19	21	27	30	33	36	39	29
geese	2	-	-	105	81	-	-	-	0	30	46

Content	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
ducks and guineafowl	0	-	-	-	4	-	-	-	1	3	12
CR – large livestock (over 185 g)											
total	31	22	1	1	11	43	37	22	45	48	38
chickens	15	28	3	1	0	10	9	3	3	1	3
ducks	-	-	-	-	-	-	-	-	-	-	-
geese	-	-	-	-	-	-	-	-	-	-	-
turkeys	81	8	0	1	19	97	111	67	193	182	108
guineafowl	-	-	-	-	-	-	-	-	0	-	-

Source: own work based on the Ministry of Finance data, *Rolnictwo w 2004 r., (…) w 2014 r*., Główny Urząd Statystyczny, Warszawa 2005, …, 2015, http://ec.europa.eu/agriculture/statistics/trade/2013/annex3_en.pdf download date: 17.09.2014.

The increase in the export specialisation index (for total poultry products) is favourable and at the same time the import penetration ratio has not undergone a significant increase, which means that it may be concluded that the international competitiveness of this sector is satisfactory. It needs to be pointed out, however, that the sector is more and more dependent on international markets. In 2014, over 40% of domestic products were exported. Moreover, a small part of domestic consumption was satisfied by import.

Conclusions

To sum up the above deliberations, it may be observed that there was a dynamic increase in the foreign trade turnover for live poultry. Despite a tendency for decreased profitability of poultry production (measured with the poultry purchase price to feedstuff price ratio), the domestic production of poultry was on the increase. The domestic poultry production is being more and more exported. Although the presented study shows a fairly broad and many-sided theoretical and empirical analyses of international trade in live poultry, it should not be considered closed. It constitutes a benchmark for further studies focused on a fuller understanding of the international competitiveness of the poultry sector, especially of individual assortments of poultry meat and processing products. Furthermore, there is a need to examine other determinants of the profitability of poultry breeding in Poland (e.g. labour cost), especially that the poultry sector is foreseen to be developing not only in Poland but also in the EU. This process will be further fostered by consumers, who will choose this type of meat more and more often [Pirvutoiu, Popescu 2012, p. 447].

The above deliberations are important both for the producers and processors of poultry. Therefore, it seems that there is a need for constant monitoring foreign purchasers of Polish poultry products (including live poultry) in the context of their aspirations towards domestic self-sufficiency in individual poultry assortments. The provision of self-sufficiency in the production of chicks by a given country that purchases this assortment in Poland may result in some hatcheries' need to seek other markets (not necessarily abroad) or to change their business (e. g. fattening chicks in Poland, production of different species of chicks than before).

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