

STRUCTURAL CHANGE IN THE ROMANIAN AGRICULTURE: IMPLICATIONS FOR THE FARMING SECTOR

Elena BULARCA (OLARU), Elena TOMA

University of Agricultural Sciences and Veterinary Medicine Bucharest, 59 Marasti, District 1, 11464, Bucharest, Romania, Phone/Fax: 00 40 762 2733 53; Email: bularca_elena@yahoo.com, elenatoma2001@yahoo.com

Corresponding author: bularca_elena@yahoo.com

Abstract

The paper describes changes observed in Romanian agriculture from 2002 until 2016, against the background of the situation in previous years. Romania's membership in the European Union has substantially changed the farming conditions in Romanian agriculture. Thus, the question arises: what has changed in that sector in recent years? The present article contains an attempt to answer this question. Therefore, the main of this article is to describe the agricultural holdings situation and evolution in 2002-2016 period using data from the Agricultural Census (2002, 2010 years) and Farm Structure Survey (2005, 2007, 2013, 2016 years). During the 2002- 2016 period, the number of agricultural holdings has been declining. It shows that the large agricultural holdings which represent 0, 5% of total agricultural holdings manage more than 50% of utilised agricultural area. The situation of Romanian agriculture has improved substantially and it is characterised by a traditional farming which is the most dominant in terms of numbers of people involved and the geographical coverage. In Romania agriculture is an important contributor towards national economic performance.

Key words: agricultural holdings, evolution, number, size, distribution, implications

INTRODUCTION

Agriculture is a large and important sector in most developing countries, being connected to other sectors. This results from the fact that agriculture is a source of supply for a unique consumption good, a source of demand for non- agricultural products and a potential source of labor, land and capital [4].

The role of agriculture sector has suffered significant transformation in the past years [2]. The World Bank (2008) said that agriculture has features which make it a unique instrument for development [14].

An important role in a global economy has the evolution of farms structure which is a part of an elaborate evolution of the farm sector [1]. In the world are more than 570 million agricultural holdings, more than 500 million of these are family farms and about 84% of farms are smaller than 2 ha. The world agricultural production is produced in family farms with a high share across almost all countries, using 75% of the world's agricultural land. Farms that have less than 2

ha, named small farms, operate 12% of the world's land and produce a consistent share of the world's food [6]. The same holds true for EU where farming is primarily a family activity, more than 75% of agricultural labour force was provided by family members. Predominantly, in EU-28, "the most common size of farm is with 2-20 hectares of utilised agricultural area" [3].

In 2013, Romania had 3.63 million farms (on the first place in EU) [11], but until 2016 their number was declining with almost 6% (with 11% compared to 2010). The utilised agricultural area of an agricultural holding in 2016 was 3.65 ha, compared to 3.60 ha in 2013 [9].

In this context, the paper aimed to analyse the evolution of the number holdings by legal structure, average holdings size, farm distribution, type of land tenure, land use, crops structure and animals statistical analysis. These aspects were discussed and analyzed in 2002- 2016 period in Romania

MATERIALS AND METHODS

In order to set up this article, it has been calculated a system of statistical, analytical and synthetic indicators which, after the way of calculation and expression, can be structured in the following way: absolute indicators, relative indicators and average indicators [13]. It has been calculated and interpreted, largely, the succeeding indicators: the number of agricultural holdings (number), the utilised agricultural area (hectare), the average physical size of the agricultural holdings (hectare/farm), the livestock number (number), the employed persons in agriculture sector (number) and the number of worked days in agricultural holdings (number).

For processing and interpretation of the data have been use two methods: the index method and the comparison method. The index method is the most important method in the dynamic of phenomena evolution and uses two types of index: fixed base index and chain base index. It also has been use the growth/decay rate which refers to the percentage change of a specific variable within a specific time period, given a certain context [5].

The period analysed in this study was 2002-2016.

The data for the period 2002-2016 were collected from National Institute of Statistics and have been statistically processed and interpreted.

RESULTS AND DISCUSSIONS

The number of agricultural holdings has continuously decreased from 4,485 million in the year 2002 to 3,422 million in the year 2016, as a result of land concentration, meaning a decrease of 24% (Figure 1).

After the calculation of chain base index of agricultural holdings, it observes that this value is between 92 and 98%, the higher decrease was about 8% in 2007 compared to 2005, with the accession of Romania to the European Union.

Analysing the number of agricultural holdings by legal status, it is remarked that the agricultural holdings without legal personality

constitute most of Romanian farms, more than 99% (Figure 2).

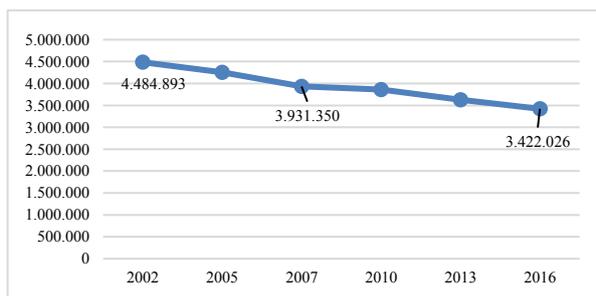


Fig. 1. Evolution of Agricultural Holdings during the period 2002-2016

Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2002-2016, NIS[7, 8]

Analysing the number of agricultural holdings by legal status, it is remarked that the agricultural holdings without legal personality constitute most of Romanian farms, more than 99% (Figure 2). These farms are mainly family farms with extensive semi-natural grassland pastoral systems and mixed farming systems [10].

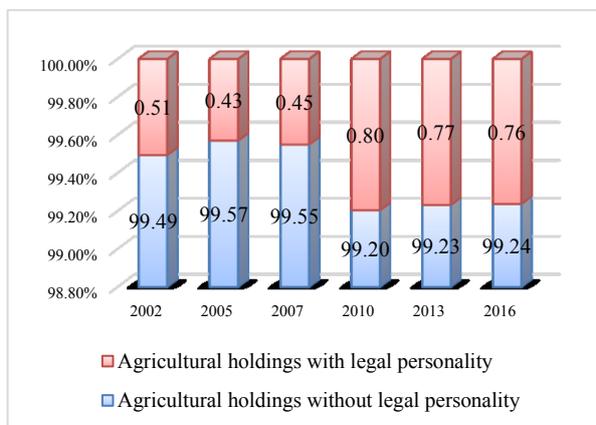


Fig. 2. Share of Total Number of Agricultural Holdings by legal status during the period 2002-2016 (%)

Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2002-2016, NIS [7, 8]

In Romania, the units with legal status are represented by agricultural companies or associations, commercial companies, units of public institutions, co-operative units and others categories. The number of agricultural units with legal status increased with 15% in 2016 compared to 2002. The principal reason of this increase is the duplication of the commercial companies number (Figure 3).

After the fall of communism, in Romania faced broke up the collective farms and appeared uncertainty of ownership. These individual parcels which are very small became dedicated to the subsistence crops and are habitually cultivated by peasants.

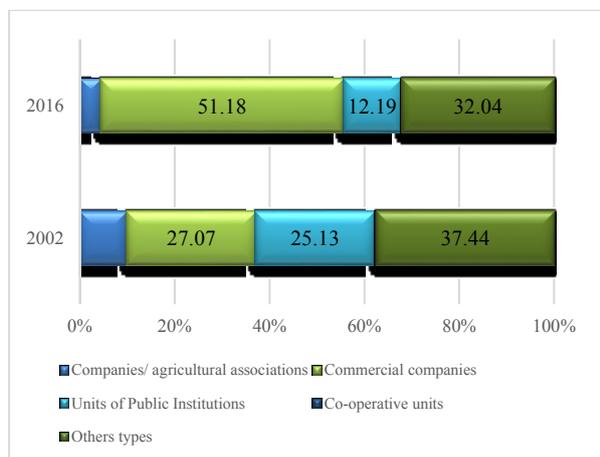


Fig. 3. Share of number of Agricultural Holdings with legal personality during the period 2002-2016 (%)
 Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2002-2016, NIS [7, 8]

The largest share of agricultural holdings under 2 ha is representative for the distribution of the agricultural holdings by physical size classes.

The very small farms constitute more than 65% of total of farms. In the evolution of the distribution of agricultural holdings by physical size classes, a decreasing trend can be observed in the number of very small holdings with less than 2 ha.

This was a consequence of concentration land which produced the growth of the medium sized farms with 95%, large farms with 56% and very large farms with 20% in 2016 compared with 2002 (Table 1).

The distribution of Romanian agricultural holdings by size classes must be investigated in affinity with the utilized agricultural area distribution: the agricultural holdings under 2 ha utilized 12% of the agricultural area (decreasing with 2pp compared to 2002); the farms with 50 and over 50 ha used more than 50% of agricultural area (Figure 4).

Table 1. The distribution of agricultural holdings by different size classes in Romania

Size class (ha)	Number						% of total					
	2002	2005	2007	2010	2013	2016	2002	2005	2007	2010	2013	2016
Very small: less than 2 ha	3,067,148	2,721,713	2,485,566	2,725,676	2,589,924	2,400,930	71.34	66.04	64.53	70.88	72.67	71.84
Small: 2-20 ha	1,208,683	1,369,585	1,335,718	1,077,167	934,776	904,409	28.11	33.23	34.68	28.01	26.23	27.06
Medium sized: 20-50 ha	9,477	16,119	16,107	20,158	18,727	18,523	0.22	0.39	0.42	0.52	0.53	0.55
Large: 50-100 ha	3,850	4,939	4,791	7,796	7,263	6,013	0.09	0.12	0.12	0.20	0.20	0.18
Very Large: more than 100 ha	10,203	8,891	9,608	14,448	13,075	12,310	0.24	0.22	0.25	0.38	0.37	0.37
Total	4,299,361	4,121,247	3,851,790	3,845,245	3,563,765	3,342,185	100	100	100	100	100	100

Source: Own calculation on the basis of data from Farm Structure Survey and Agricultural Census data base 2002-2016, NIS

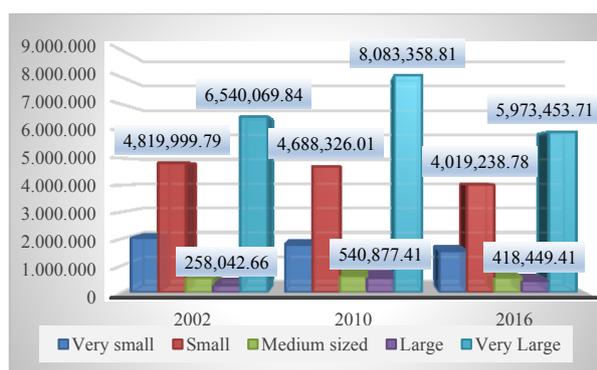


Fig. 4. The distribution of utilized agricultural area by different size classes of the agricultural holdings
 Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2002-2016, NIS [7]

The total utilised agricultural area of Romania was around 12,5 million ha in 2016, it has been decreased (-10.25%) from 2002 to 2016 (Figure 5).

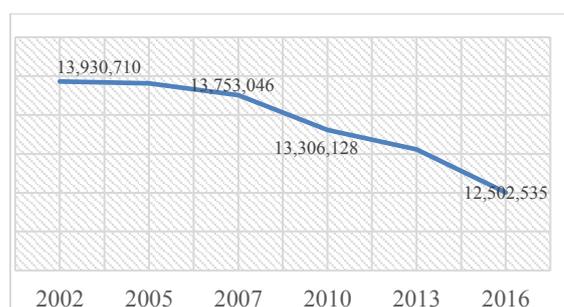


Fig. 5. Utilized agricultural area (UAA) in Romania in 2002-2016 period

Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2002-2016, NIS [7, 8]

The biggest decreasing was observed after the accession of Romania to the European Union and this trend has been caused by privatization and redistribution of agricultural land because Romania encounters a profound

restructuring process regarding their agricultural sectors.

Table 2. The average physical size of the Romanian agricultural holdings

Specification	2002	2005	2007	2010	2013	2016
Agricultural holdings (numbers)	4,484,893	4,256,152	3,931,350	3,859,043	3,629,656	3,422,026
Utilized agricultural area (hectares)	13,930,710.10	13,906,701.28	13,753,046.49	13,306,128.33	13,055,849.80	12,502,535.49
Average of UAA (ha)	3.11	3.27	3.50	3.45	3.60	3.65

Source: Own calculation on the basis of data from Farm Structure Survey and Agricultural Census data base 2002-2016, NIS [7,8]

In Romania, the average area of the agricultural holdings was growing from 3.11 hectares in 2002 to 3.65 hectares in 2016 (Table 2). The above- mentioned size together with the unreasonable parcelling of the land area, are causing great difficulties in practicing a performant and competitive agriculture, in crop rotation, in the use of technical means and modern technologies, etc [12].

A special importance in the increase or decrease of the physical size of farms is hold by the progress of the land market with its primary components: in property, concession, land leasing, etc [12].

From 2002 to 2016 the distribution of UAA has dramatically changed (Figure 6). In the whole period the UAA into ownership had the biggest share which was down by 14pp in 2016 compared to 2002. This decrease of UAA in property resulted in an increase of UAA on lease (+23 pp).

The other categories consist of land concession, share cropping, land concession, land utilized on free of charge basis, etc. and it has a relatively decreasing share.

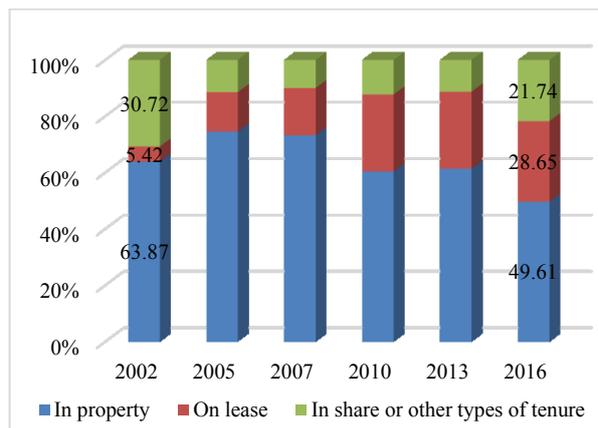


Fig. 6. Utilized agricultural area (UAA) by land modality in 2002-2016 period (%)

Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2002-2016, NIS [7, 8]

In 2002-2016 period, the utilised agricultural area was relatively decreasing for all categories of use (Table 3). The share of the UAA by categories of use is entirely important for the present and the future of Romanian agriculture. We mention that the arable land owns the largest share of UAA (63-64%) followed by pastures and meadows (32-34%) and the less share held by kitchen gardens and permanent crops (under 5%).

Table 3. The distribution of UAA by categories of use in 2002-2016 period

Specification	2002		2005		2007		2010		2013		2016	
	Hectares	% of UAA										
Arable land	8,773,749	62.98	8,866,592	63.76	8,691,343	63.20	8,306,416	62.43	8,197,590	62.79	7,813,433	62.49
Kitchen gardens	168,865	1.21	170,612	1.23	177,945	1.29	182,025	1.37	157,439	1.21	142,333	1.14%
Pastures and meadows	4,644,005	33.34	4,530,298	32.58	4,540,135	33.01	4,506,253	33.87	4,398,346	33.69	4,245,421	33.96
Permanent crops	344,092	2.47	339,199	2.44	343,623	2.50	311,433	2.34	302,474	2.32	301,348	2.41%
Total of UAA	13,930,710	100.0	13,906,701	100.0	13,753,046	100.0	13,306,128	100.0	13,055,850	100.0	12,502,535	100.0

Source: Own calculation on the basis of data from Farm Structure Survey and Agricultural Census data base 2002-2016, NIS [7,8]

In evolution of the agricultural holdings by categories of use of UAA, it observed a continuous decrease (Figure 7). From 2002 to 2016, the number of farms with arable land has down by 30%, with kitchen garden by

17.5%, with pastures and meadows by 24% and with permanent crops by 24.5%.

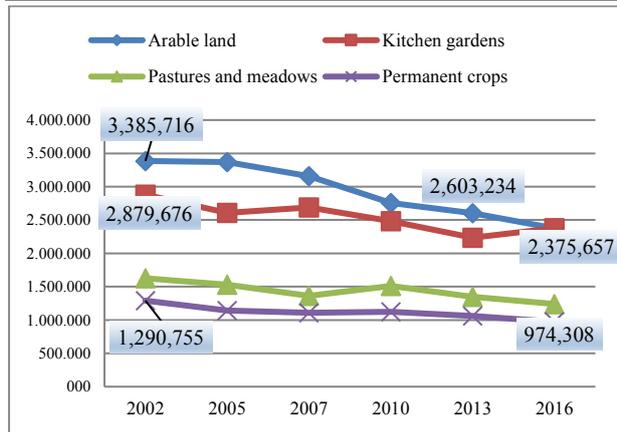


Fig. 7. The evolution of agricultural holding by categories of use of UAA, in 2002-2016

Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2002-2016, NIS [7, 8]

We noticed that in the all analysed period, the share of categories use of arable use was keeping the same (Figure 8). The largest share of UAA is owned by cereals grains (more than 60% of arable land), followed by industrial plans (19%) and green fodder (10%).

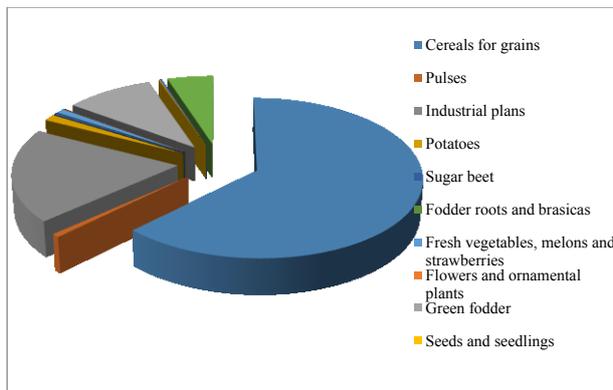


Fig. 8. The share of UAA by categories of arable land 2016 (%)

Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2002-2016, NIS [7, 8]

Analysing the evolution of arable land in 2016 compared to 2002 (Figure 9), we observed significantly changes, the highest growth has occurred in the flowers and ornaments category (by +150%) and the biggest fall has occurred in fodder roots and brassicas category (-72%).

We observed that, excepting macroregion one, all the macroregions have a large share of UAA in arable land (more than 50%). Macroregion one has 58% of UAA utilised by

pastures and meadows due to climatic conditions (Figure 10).

The livestock number from 2002 to 2016 is significantly decreasing in bovine (- 36%), pigs (50%) and poultry (- 6%). The number of goats, sheep and bee families has increased by 85%, 26% and 73% (Figure 11).

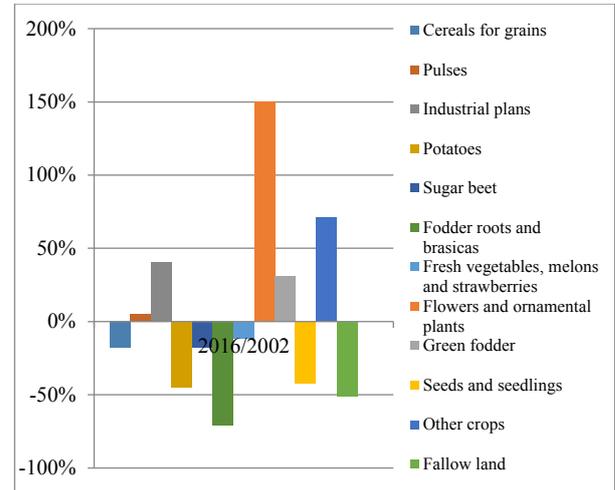


Fig. 9. The evolution of arable land in 2016 compared to 2002

Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2002-2016, NIS [7]

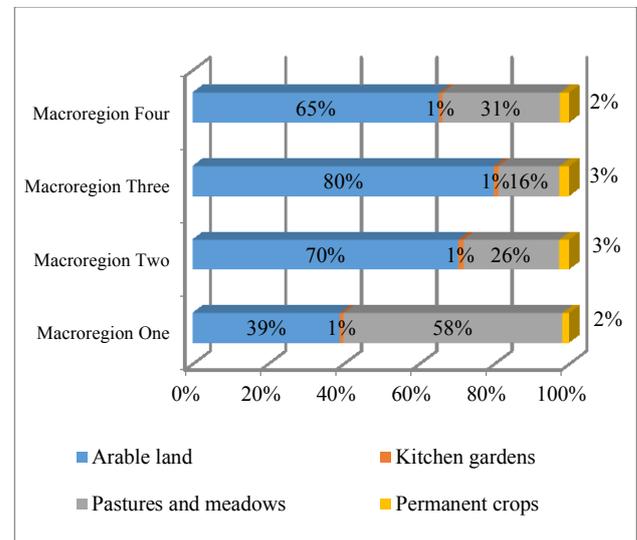


Fig. 10. The share of utilised agricultural area by macroregions in 2016

Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2002-2016, NIS [7, 8]

Analysing the agricultural holdings with livestock by the most important species, we observed that the share of pigs farms has been decreasing (by - 20 pp) opposite to the share

of poultry farms which has been increasing by 40 pp from 2002 to 2016 (Figure 12).

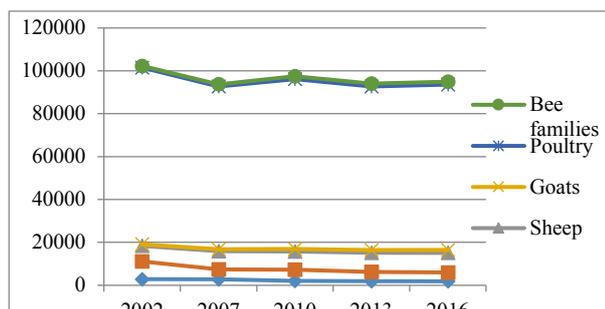


Fig. 11. The evolution of livestock numbers by species in Romania in 2002- 2016 (thousands)

Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2002-2016, NIS [7, 8]

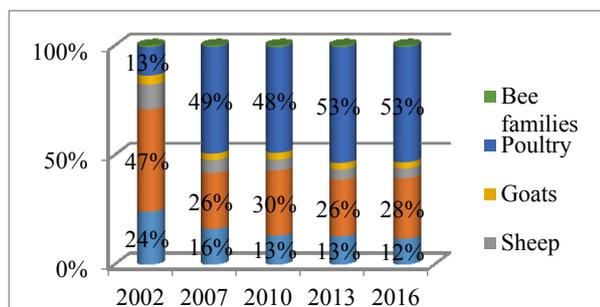


Fig. 12. The distribution of agricultural holdings with livestock by species

Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2002-2016, NIS [7, 8]

From 2002 to 2007, the number of men employment in agriculture has decreased

more rapidly (-33%), then from 2007 to 2010 it has increased (+12%) and in the last period, 2010- 2016, it decreased slightly (-14%).

The number of women employed in agriculture registered substantial increases and decreases in the same manner as the number of men employed in agriculture, from 4,437 million in 2002 to 2,904 million in 2016 (Figure 13).

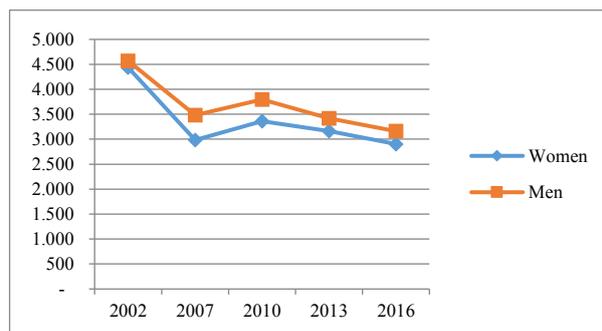


Fig. 13. The evolution of employed persons, by gender in agricultural sector 2002-2016 period (millions)

Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2002-2016, NIS [7, 8]

The share of men and women regularly employed in the Romanian agricultural sector has been the same in the analysed period, men represented more than 50% of the total agricultural labour force (Table 4).

Table 4. The number and share of employed persons, by gender in agricultural sector 2002-2016 period (million persons)

Specification	2002		2007		2010		2013		2016	
	Number	% of total								
Women	4,437	49	2,984	46	3,359	47	3,164	48	2,904	48
Men	4,570	51	3,484	54	3,798	53	3,418	52	3,161	52
Total	9,007	100	6,468	100	7,157	100	6,582	100	6,065	100

Source: Own calculation on the basis of data from Farm Structure Survey and Agricultural Census data base 2002-2016, NIS [7, 8]

The number of persons employed in agricultural sector varies during the analysed period, but the number of worked days in agriculture has been declining in throughout the period analysed. The number of worked days by women decreased by 52% and in man by 49% (Table 5).

Table 5. The number of worked days, by gender, in agricultural holdings in 2002- 2016 (millions)

Specifi- cation	2002	2007	2010	2013	2016	2016/ 2002
Women	308	227	161	156	148	48%
Men	369	274	207	200	187	51%

Source: Own calculation on the basis of data from Farm Structure Survey and Agricultural Census data base 2002-2016, NIS [7, 8]

CONCLUSIONS

In 2002- 2016, the situation of Romanian agriculture has improved.

Due to the land concentration process, the number of agricultural holdings decreased by 24 %, but the number of agricultural holdings without legal personality holds more than 99 % of total agricultural holdings. However, the agricultural holdings under 2 ha have only a little part of UAA. The largest part of utilised agricultural area appertains to agricultural holdings with 50 and over 50 ha, considered in this article as large and very large farms.

The land concentration process has a determined impact in the average physical size of agricultural holdings. This increased from 3.11 ha in 2002 to 3.65 ha in 2016.

It is very important to analyse the distribution of utilised agricultural area by land modality. The complete transfer of agricultural land ownership occurs after the fall of communism. The sale-purchase of lands skilled major decrease compared to the land lease.

In 2002, the land in property totalized 8,897 million ha (64% of UAA) and in 2016 decreased to 6,203 million ha (50% of UAA). The land lease had a greater development from 755 thousand in 2002 (5% of UAA) to 3.582 thousand in 2016 (29% of UAA).

Analysing distribution of utilised agricultural area by categories of use, we noticed that the arable land occupies the most important part of utilised agricultural area, more than 60 % in all analysed period. At macro regions level, the situation remains unchanged; an exception is macroregions one because of its specific climatic conditions, the majority of utilised agricultural area is occupied by pastures and meadows, over 50%. Therefore, the arable farmed areas predominate in the east, the south and the extreme west of Romania, while permanent grasslands and livestock farming are concentrated in the central and northern areas of the country.

We have analysed the evolution of arable land from 2002 to 2016 and we found that there are significantly changes. The highest increase occurred in utilised agricultural area of flowers and ornament category as opposed to

the biggest fall of analysed categories, by - 72%, in fodder roots and brassicas category.

The livestock number has undergone significant changes due to decreasing of pigs and poultry number. A positive aspect is in the beekeeping field because of the increasing of bees families by 73% in 2016 compared to 2002. In the analyse of the share of agricultural holdings with livestock by species in total of agricultural holdings, we noticed that the share of agricultural holdings with pigs was 47% in 2002 as opposed to 28% in 2016, the share of agricultural holdings with bovine was 24% in 2002 as opposed to 12 % in 2016 and the agricultural holdings with poultry was 13% and has increased to 50% in 2016, even if the number of poultry in agricultural holdings has decreased by 6% in the same period.

In researching of the Romania agricultural employment, we concluded that the number of persons employed in agricultural sector has decreased from 9 million persons in 2002 to 6 million persons in 2016. The male persons occupy the biggest share of employed persons in agricultural sector, over 51%. The number of worked days by gender also has reduced from 308 million worked days in 2002 to 148 million worked days in male persons and from 369 million worked days in 2002 to 187 million worked days in 2016 in female persons. This significant decrease was largely due to the improvement and modernisation of agriculture in order to meet new environmental and economic challenges.

In conclusion, we have achieved a satisfactory result in analysing of agricultural sector in 2002- 2016. Romania is rich in family farms which are the source of strength in the Romanian economy, society, culture and sustainability of agriculture.

ACKNOWLEDGEMENTS

This research work was carried out with the support of National Institute of Statistics and it also will be used in the PhD thesis of the author, named “Researches on the productivity and profitability of the agricultural holdings”.

REFERENCES

- [1]Chavas, J-P., 2005, Structural change in agricultural production: Economics, technology and policy. Handbook of Agricultural Economics. Vol. 1, Part A, 2001, Pages 263-285.
- [2]Eretova, V., Jancak, V., 2017, The past, present and future of diversification of agricultural holdings in Czechia. *AUC Geographica*, 52:27-37.
- [3]Eurostat. Statistical Books. Agriculture, forestry and fishery statistics. 2016 Edition. Available on Eurostat website at: <http://ec.europa.eu/eurostat>, Accessed January 10, 2018.
- [4]Gollin, D., College, W., 2010, Agricultural productivity and structural change. NSF-AERC-IGC Technical Session on Agriculture and Development, Mombasa, Kenya.
- [5]Investopedia Academy. Accessed on 25 January 2017 at <https://www.investopedia.com/terms/g/growthrates.asp>.
- [6]Lowder, K.S., Scoet, J., Raney, T., 2016, The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide. *World Development*. Volume 87, November 2016, Pages 16-29.
- [7]National Institute of Statistics. Agricultural Census. 2002, 2010.
- [8]National Institute of Statistics. Farm Structure Survey, 2005, 2007, 2013, 2016.
- [9]National Institute of Statistics, 2017, Press release no. 324/ 15 December 2017. *Agriculture Field*. Available on www.insse.ro/cms/sites/default/files/com_presa/com_pdf/asa_2016r_2.pdf, Accessed on January 10, 2018.
- [10]Page, N., Popa, R., 2013, Family Farming in Romania. Fundația ADEPT Transilvania. Saschiz. www.fundatia-adept.org, Accessed on January 10, 2018.
- [11]Popescu, A., Alecu, I.N., Dinu, T.A., Stoian, E., Ciocan, H., 2016, Farm Structure and Land Concentration in Romania and the European Union's Agriculture. *Agriculture and Agricultural Science Procedia* Volume 10, 2016, Pages 566-577.
- [12]Popescu, M., 2010, Physical Size of Agricultural Holdings in Romania. Gaps between Romania and the European Union Member States. Institute of Agricultural Economics, Romanian Academy. *Agricultural Economics and Rural Development*, New Series, Year VII, no. 1, p. 17–36.
- [13]Titan, E., Ghita, E., Trandas, C., *Statistica Economica*. Available on <http://www.biblioteca-digitala.ase.ro/biblioteca/carte2.asp?id=116&idb>, Accessed on January 10, 2018.
- [14]World Bank, 2007, *World Development Report 2008: Agriculture for Development*. Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/5990> License: CC BY 3.0 IGO, Accessed on January 10, 2018.