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THE LIVESTOCK EVOLUTION ANALYSIS FOR THE MAIN ANIMAL SPECIES IN THE EUROPEAN UNION AND IN ROMANIA

Manea DRAGHICI[1], Nicolae STERGHIU[1], Raluca NECULA[1]

[1]University of Agricultural Sciences and Veterinary Medicine Bucharest, 59 Marasti, District 1, 11464, Bucharest, Romania, Phone/Fax: 00 40 744 6474 10; E-mail: dmprofesor@hotmail.com , E-mail: nicolae.sterghiu@apia.org.ro**,** E-mail: raluca_nec@yahoo.com

Corresponding author: raluca_nec@yahoo.com

Abstract

The livestock problems were permanent in the national and community ensemble attention of agricultural production. These issues were inextricably linked to the evolution of the number of animals. These issues were analyzed in the period 2005-2012 dynamic, effectivelly being taken under consideration the animals number/100 ha, but also the territorial structure of Romania developing regions. For the period analyzed, we took into account the changes in the level of animal numbers from the previous year, and compared to the base year, which defined the meaning of a certain rhythm. Presentations were made for the main animal species based on evolutionary trends for cattle, pigs and sheeps.

Key words*: cattle, coefficient of variation, evolution, growth rate, livestock, pigs, sheep*

INTRODUCTION

Along with the vegetal sector, the livestock sector represents an important sector of the national economy in general and for agriculture in particular, providing raw material for food industry and food for population.
Revitalizing the agriculture is difficult or even impossible without the development of the livestock sector, but it can be made by reconsidering the role and place that this sector have to occupy in the national economy.
The cattle swine and sheep breeding is a traditional activity of rural population.
The variety of products it produces, the low power consumption and the feed nature they capitalize, confers their growth and exploitation a sustainable and perspective activity character. It provides the possibility of achieving the requirement production for domestic and export of meat, bringing high source of income for the producers. It is a commercial exchange source. It ensures labor stability in the countryside [5].

MATERIALS AND METHODS

To highlight the evolution of livestocks during the review period, a number of statistical indicators was used, namely [1]:

For arithmetic mean = $\bar{x} = \frac{\sum xi}{n}$, where:
$\overline{X}$ = arithmetic mobile mean; Xi = average production values on a number of year (i);
n = the number of years taken into account.
Average annual growth rate[4]:
$= r2005-2012 = \sqrt[8]{\prod (p1/p0) - 1}$; in which:
r2005-2012 = average annual growth rate; ∏p1/po = chained growth indicators
For standard deviation = $\partial = \sqrt{\frac{\sum(\bar{x}-xi)^2}{n-1}}$;
where: ∂ = standard deviation ; xi = average production values over a number of years,
n = the number of years taken into account.
For the variation coefficient = $C = \frac{\delta}{\bar{X}} x100$,
where:
C – the variation coefficient (expressed in percent)
The coefficient of variation can be: between 0-10% - low variation, between 10-20% - middle variation, over 20% - large variation.
The data used have had as source: Statistical Yearbook of Romania, Eurostat statistics, the National Strategic Framework for sustainable development of the Agri-Food Sector and Romanian Rural Areas in 2014-2020, data from the specialized literature.

RESULTS AND DISCUSSIONS

The cattle livestock

Table 1.- The cattle number evolution in European countries for 2005-2012 (thousand heads)

Country	MU	2005	2006	2007	2008	2009	2010	2011	2012	*Avergage/ Rhythm*	Stand Dev. (th.Hd.))	Coef var(%)
Germany	Th. Hd.	12918.6	12676.70	12707.30	12987.50	12897.20	12706.20	12527.80	12506.80	12741.0	167	*1.31*
	% in chain		*0.98*	*1.00*	*1.02*	*0.99*	*0.99*	*0.99*	*1.00*	*-0.46*	X	X
Bulgaria	Th. Hd.	630	636.50	611.00	574.10	547.90	553.70	567.50	535.30	582.0	36	*6.23*
	% in chain		1.01	0.96	0.94	0.95	1.01	1.02	0.94	*-2.30*	X	X
France	Th. Hd.	18930	18902.00	19124.00	20028.00	19842.00	19599.00	19129.00	19052.00	19325.8	407	*2.11*
	% in chain		1.00	1.01	1.05	0.99	0.99	0.98	1.00	*0.09*	X	X
Hungary	Th. Hd.	708	702.00	705.00	701.00	700.00	686.00	694.00	753.00	706.1	19	*2.67*
	% in chain		0.99	1.00	0.99	1.00	0.98	1.01	1.09	*0.88*	X	X
Italy	Th. Hd.	6459.9	6340.20	6577.00	6486.30	6446.70	5832.50	5897.50	6091.50	6266.5	268	*4.28*
	% in chain		0.98	1.04	0.99	0.99	0.90	1.01	1.03	*-0.84*	X	X
Portugal	Th. Hd.	1494.7	1451.70	1491.50	1495.30	1446.50	1502.80	1519.10	1497.50	1487.4	24	*1.58*
	% in chain		0.97	1.03	1.00	0.97	1.04	1.01	0.99	*0.03*	X	X
Romania	Th. Hd.	2861.1	2933.60	2819.00	2683.60	2512.30	2001.10	1988.90	2009.10	2476.1	387	*15.65*
	% in chain		1.03	0.96	0.95	0.94	0.80	0.99	1.01	*-4.92*	X	X
EU -27	Th. Hd.	89893.2	88846.10	89431.50	89954.10	89381.70	87391.20	86250.30	86649.50	88474.7	1393	*1.57*
	% in chain		0.99	1.01	1.01	0.99	0.98	0.99	1.00	*-0.52*	X	X

*2012 - Provisional data, Source: Eurostat, June 2013, National Strategic Framework for sustainable development of the agri-food sector and Romanian rural areas 2014-2020 (Rural National Strategic Framework) CRPCIS, 2012 [3]

For the bovine specie, regarding the livestock evolution in some European countries in the period 2005-2012, it can be found differentiated trends. The comparisons in years succession, signifies for the total EU, Germany, Bulgaria, Italy and Romania reductions in number, and for the other countries are recorded stagnation or growth. For this rhythms both for total EU as well as most countries are negative, the oscillations being between -0.52 for the total EU and -4.92 for Romania (except France and Hungary).

Further, the appreciation levels of the variation coefficient means a small variation (0-10%) both for the entire EU and for most countries (oscillations being between 1.31 for Germany and 6.23 Bulgaria). Only Romania joins the group with middle variation (10-20%) with a significant degree of variation coefficient of 15.65. It appears that from this point of view, Romania ranks last, recording the most significant rate of decline. Hungary and the Netherlands are countries where cattle have marked an increase of 6.4% in 2012 compared to 2005 [6].

In Romania, during 2005-2012, the cattle number variation showed significant amplitudes, which is why further this situation is analyzed territorial. In Table 2 through the indicator bovine number / 100 ha is presented this situation at national and regional level , both comparisons being made compared to 2007 and subsequently in years of the analized period.

By comparison of the 2012 trends with year 2007, it is declining, but in the years successiveness there is a recovery in the number (this meaning being certain, especially for the last years of the period).

For the bovine territorial structures and at the national ensemble, the rhythm is negative, which means that for the period analyzed (2007-2012) still exhibit a strong tendency of decrease in the number of cattle.

For the swine livestock analysis, was pursued both for all European countries but also in the structure of the main countries. According to the data in Table 3, it can be found differences by comparing in time together with statistical significance.

The pig livestock

Table 3.- The pig livestock evolution in EU countries, for the period 2005-2012(thousands heads)

Country	MU	2005	2006	2007	2008	2009	2010	2011	2012	*Avergage/ rhythm*	Stand Dev. (th.Hd.))	Coef of var %
Germany	Th. Hd.	26989	26821	27113	26719	26841	26901	27403	28331	27139.6	492	*1.81*
	% in chain		0.99	1.01	0.99	1.00	1.00	1.02	1.03	*0.70*	X	X
Bulgaria	Th. Hd.	932.70	1012.70	888.60	783.70	729.80	664.00	608.30	530.90	768.8	156	*20.35*
	% in chain		1.09	0.88	0.88	0.93	0.91	0.92	0.87	*-7.73*	X	X
France	Th. Hd.	15123.0	15009.0	14969.0	14810.0	14552.0	14279.0	13967.0	13778.0	14560.9	473	*3.25*
	% in chain		0.99	1.00	0.99	0.98	0.98	0.98	0.99	*-1.32*	X	X
Hungary	Th. Hd.	3853.00	3987.00	3871.00	3383.00	3247.00	3169.00	3025.00	2956.00	3436.4	383	*11.16*
	% in chain		1.03	0.97	0.87	0.96	0.98	0.95	0.98	*-3.72*	X	X
Italy	Th. Hd.	9200.00	9281.10	9273.00	9252.40	9157.10	9321.10	9350.80	8661.50	9187.1	207	*2.25*
	% in chain		1.01	1.00	1.00	0.99	1.02	1.00	0.93	*-0.86*	X	X
Portugal	Th. Hd.	1955.00	1916.80	1978.20	1954.60	1944.60	1917.30	1985.00	2024.10	1959.5	34	*1.72*
	% in chain		0.98	1.03	0.99	0.99	0.99	1.04	1.02	*0.50*	X	X
Romania	Th. Hd.	6603.80	6814.60	6564.90	6173.70	5793.40	5428.30	5363.80	5234.30	5997.1	585	*9.75*
	% in chain		1.0	1.0	0.9	0.9	0.9	1.0	1.0	*-3.27*	X	X
EU -27	Th. Hd.	158719	161550	159570	152603	151569	151130	148557	145829	153691	5268	*3.43*
	% in chain		1.02	0.99	0.96	0.99	1.00	0.98	0.98	*-1.20*	X	X

Sursa: Eurostat, june 2013, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database [2]

Comparison in the period 2005-2012, shows an increase only in the situation of Germany and Portugal, and in the EU ensemble and the rest reductions in livestock. Under this situation, the rhythm remains positive at only two countries (Germany and Portugal) and , for the EU and the other countries we found a downward level, the values being negative.

Table 4. The swine stock/100 ha, at the country level, in the development regions, 2007-2012.

Region/ county	MU	2007	2008	2009	2010	2011	2012	*Average/ Rhythm*
TOTAL	No/100ha	75.7	70.8	65.9	59.3	59.6	58.2	*64.9*
	% compared to 2007	*100.0*	*93.5*	*87.1*	*78.3*	*78.7*	*76.9*	*x*
	% in chain		*0.935*	*0.931*	*0.900*	*1.005*	*0.977*	*-5.1*
Reg. NORTHWEST	No/100ha	92	92.3	85.9	69.5	71.4	71.1	*80.4*
	% compared to 2007	*100.0*	*100.3*	*93.4*	*75.5*	*77.6*	*77.3*	*x*
	% in chain		*1.003*	*0.931*	*0.809*	*1.027*	*0.996*	*-5.0*
Reg CENTRE	No/100ha	111.1	96.1	83.8	70.1	74.7	71.7	*84.6*
	% compared to 2007	*100.0*	*86.5*	*75.4*	*63.1*	*67.2*	*64.5*	*x*
	% in chain		*0.865*	*0.872*	*0.837*	*1.066*	*0.960*	*-8.4*
Reg NORTH EAST	No/100ha	62.4	60.3	55.8	44.7	47.3	44.9	*52.6*
	% compared to 2007	*100.0*	*96.6*	*89.4*	*71.6*	*75.8*	*72.0*	*x*
	% in chain		*0.966*	*0.925*	*0.801*	*1.058*	*0.949*	*-6.37*
Reg SOUTH EAST	No/100ha	52.2	48.4	48.1	49	47	45.1	*48.3*
	% compared to 2007	*100.0*	*92.7*	*92.1*	*93.9*	*90.0*	*86.4*	*x*
	% in chain		*0.927*	*0.994*	*1.019*	*0.959*	*0.960*	*-2.9*
Reg SOUTH-MUNTENIA	No/100ha	60.4	55.2	50.1	50	49.1	48	*52.1*
	% compared to 2007	*100.0*	*91.4*	*82.9*	*82.8*	*81.3*	*79.5*	*x*
	% in chain		*0.914*	*0.908*	*0.998*	*0.982*	*0.978*	*-4*
Reg BUCHAREST - ILFOV	No/100ha	214.4	210.6	183.4	143.8	135.5	112.2	*167*
	% compared to 2007	*100.0*	*98.2*	*85.5*	*67.1*	*63.2*	*52.3*	*x*
	% in chain		*0.982*	*0.871*	*0.784*	*0.942*	*0.828*	*-12.1*
Reg WEST	No/100ha	101.4	95.4	99.5	88.9	89.9	92.1	*94.5*
	% compared to 2007	*100.0*	*94.1*	*98.1*	*87.7*	*88.7*	*90.8*	*x*
	% in chain		*0.941*	*1.043*	*0.893*	*1.011*	*1.024*	*-1.9*

Sursa: Eurostat, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database [3]

Former communist countries, Bulgaria, Hungary and Romania record the lowest level, the values amplitude being between -3.27 (Romania) and -7.73 (Bulgaria). The annual change in the number is a feature that is maintained also at swine in the countries analyzed. According to the values of the coefficient of variation is established a little variation (0-10%) for all EU and most countries, a middle variation (10-20%) for Hungary and a large variation (over 20%) for Bulgaria. Thus, the former communist states are represented by the most unfavorable values in statistical assessments.

For the Romanian national level, the swine number evolution was further analyzed by the same indicator (pigs/100 ha) in territorial structure of the development regions.

In Table 4 is shown the situation where, compared towards year 2007 are established a total decrease. The comparison in the initial period analyzed signifies the same decreases, followed by a stagnation and a partial recovery (overall national and in most development regions). This level of annual declines analyzed by dispersion values determined a negative rate for all territorial structures (Bucharest-Ilfov lowest score of -12.1).

The sheep livestock

Table 5. The sheep livestock evolution in EU countries, for the period 2005-2012(thousands heads)

Country	MU	2005	2006	2007	2008	2009	2010	2011	2012	*Avergage/ rhythm*	Stand Dev. (th.Hd.))	Coef of var %
Germany	Th. Hd.	2036	2017	1925.7	1919.9	1851.7	1799.7	1657.8	1641	1856.1	140	*7.52*
	% in chain		*1.01*	*1.05*	*1.00*	*1.04*	*1.03*	*1.09*	*1.01*	*3.13*	x	X
Bulgaria	Th. Hd.	1602.3	1635.4	1526.4	1474.8	1400.3	1368	1454.6	1361.5	1477.9	97	*6.54*
	% in chain		*0.98*	*1.07*	*1.03*	*1.05*	*1.02*	*0.94*	*1.07*	*2.35*	x	X
France	Th. Hd.	8759.9	8494.2	8284.5	7715.2	7528	7955	7621	7453	7976.4	454	*5.69*
	% in chain		*1.03*	*1.03*	*1.07*	*1.02*	*0.95*	*1.04*	*1.02*	*2.33*	x	X
Hungary	Th. Hd.	1405	1298	1232	1236	1223	1181	1081	1147	1225.4	91	*7.45*
	% in chain		*1.08*	*1.05*	*1.00*	*1.01*	*1.04*	*1.09*	*0.94*	*2.94*	x	X
Italy	Th. Hd.	7954	8227.2	8237	8175.2	8012.6	7900	7942.6	7015.7	7933.0	369	*4.65*
	% in chain		*0.97*	*1.00*	*1.01*	*1.02*	*1.01*	*0.99*	*1.13*	*1.81*	x	X
Portugal	Th. Hd.	3582.7	3549	2703.1	2558.2	2367.9	2226.3	2169.9	2091.7	2656.1	558	*21.01*
	% in chain		*1.01*	*1.31*	*1.06*	*1.08*	*1.06*	*1.03*	*1.04*	*7.99*	x	X
Romania	Th. Hd.	7608.4	7678.2	8469.2	8881.6	9141.5	8417.4	8533.4	8833.8	8445.4	515	*6.10*
	% in chain		*0.99*	*0.91*	*0.95*	*0.97*	*1.09*	*0.99*	*0.97*	*-2.11*	x	X
EU -27	Th. Hd.	-	-	-	-	-	-	-	-	-	-	-

Source: Eurostat, June 2013, National Strategic Framework for sustainable development of the agri-food sector and Romanian rural areas 2014-2020 (Rural National Strategic Framework) CRPCIS, 2012 [3] [5]

Concerning the sheep livestock, it can be shown that natural resources, enhanced possibilities for providing food, environmental characteristics, the biological and physiological requirements, tradition and economic and social transformation developed in some areas of the EU, were all means to influence the spread and growth of this species. From the livestock analysis, present in each of the EU countries, shown in Table 5, it can be seen that the largest as a share , that is growing and is in exploitation we fiind in Romania, followed by France and Italy. But comparisons of successive annual variations in the analyzed period highlights differences.

For most countries regarding these livestocks, reference can be made on the permanent annual stagnation tendencies , at which Romania in the period dynamics scored a decrease. Annual variations in the number of animals, play rates ranging from 2.33 (France) and 7.99 (Portugal) level which for Romania is -2.11. The coefficient of variation given below completes the picture of homogeneity, annually analyzed in terms of sheep flocks. Thus, all countries frames a small variation (0-10%), except Portugal where this

coefficient is 21.01, considered a large variation (over 20%).

Table 6. The growth rate of the sheep and goats stock per 100 ha, at the country level, in the development regions, 2007-2012

Region/ county	MU	2007	2008	2009	2010	2011	2012	*Average/rhythm*
TOTAL	No/100ha	70.9	74.3	76.4	70.5	72.2	74.6	*73.2*
	% compared to 2007	*100.0*	*104.8*	*107.8*	*99.4*	*101.8*	*105.2*	*x*
	% in chain		*1.048*	*1.028*	*0.923*	*1.024*	*1.033*	*1.0*
Reg. NORTHWEST	No/100ha	66.8	74.3	81.1	75.9	75.5	77.7	*75.2*
	% compared to 2007	*100.0*	*111.2*	*121.4*	*113.6*	*113.0*	*116.3*	*x*
	% in chain		*1.112*	*1.092*	*0.936*	*0.995*	*1.029*	*3.1*
Reg CENTRE	No/100ha	103	105.5	106.6	109	112.5	116.1	*108.8*
	% compared to 2007	*100.0*	*102.4*	*103.5*	*105.8*	*109.2*	*112.7*	*x*
	% in chain		*1.024*	*1.010*	*1.023*	*1.032*	*1.032*	*2.4*
Reg NORTH EAST	No/100ha	78.2	86.7	89.1	71.8	76.9	79.2	*80.3*
	% compared to 2007	*100.0*	*110.9*	*113.9*	*91.8*	*98.3*	*101.3*	*x*
	% in chain		*1.109*	*1.028*	*0.806*	*1.071*	*1.030*	*0.25*
Reg SOUTH EAST	No/100ha	81.6	79.4	79.1	71.4	72.4	75	*76.5*
	% compared to 2007	*100.0*	*97.3*	*96.9*	*87.5*	*88.7*	*91.9*	*x*
	% in chain		*0.973*	*0.996*	*0.903*	*1.014*	*1.036*	*-1.7*
Reg SOUTH-MUNTENIA	No/100ha	43.1	46.2	46.7	44.7	44.9	45.8	*45.2*
	% compared to 2007	*100.0*	*107.2*	*108.4*	*103.7*	*104.2*	*106.3*	*x*
	% in chain		*1.072*	*1.011*	*0.957*	*1.004*	*1.020*	*1*
Reg BUCHAREST - ILFOV	No/100ha	35.9	40.7	34.7	32.4	36	40.7	*37*
	% compared to 2007	*100.0*	*113.4*	*96.7*	*90.3*	*100.3*	*113.4*	*x*
	% in chain		*1.134*	*0.853*	*0.934*	*1.111*	*1.131*	*2.5*
Reg WEST	No/100ha	72.8	77	84.3	75.7	78.8	83.3	*78.7*
	% compared to 2007	*100.0*	*105.8*	*115.8*	*104.0*	*108.2*	*114.4*	*x*
	% in chain		*1.058*	*1.095*	*0.898*	*1.041*	*1.057*	*2.7*

Sursa: Eurostat, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database [2]

Because Romania is the country with a significant number of ovines, further is performed a study of the dynamics of this species to which are added the goats livestock, in the 2007-2012dynamics, played into the regions territorial structure. The values shown in Table 6, based on number heads/100 ha indicator, shows an annual increase on total country. The increase phenomenon is similar also for the development regions structure, except the South-East region, where there is a decrease. Annual variations in the amplitude bounds the growth rate between 1.0 and 3.1, noting that for South East where the value of this rate, due to livestock decreases is negative (-1.7).

CONCLUSIONS

1. Regarding the cattle herds, their evolution has been done differently for European Union countries. Over the analyzed period it outlines the decreases for EU total, mainly in Germany, Bulgaria, Italy and Romania. Our country, unfortunately, ranks last, recording the most significant rate of decline.
2. For the swine livestock, also, at the total EU level , as well as for the other countries we find a negative trend. Again, our country records a bad value, ranking alongside Bulgaria and Hungary among the countries with the most unfavorable values in statistical assessments for both livestock and for its decreases.
3. The situation is different regarding the sheep livestock, which in Romania has the largest number in exploitation, followed by France and Italy. Even though our country recorded a higher number in this species livestock , in the period dynamic we see decline.
4. We conclude that the main species of animal livestock are declining in the whole European Union, raising an important issue in the debate. The regression livestock sector it is absolutely necessary, and should be taken measures to increase the number of animals, in particular the number of cattle.

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