Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development
Vol. 17, Issue 3, 2017
PRINT ISSN 2284-7995, E-ISSN 2285-3952

TECHNICAL ASPECTS REGARDING THE CLASSIFICATION OF PIG CARCASSES IN ROMANIA

Monica Esperance GĂUREANU[1], Mirela CĂRĂTUȘ STANCIU[2], Dan Ioan COCÎRCĂ[3], Livia VIDU[4], Iulian VLAD[4]

[1]"Dunărea de Jos" University of Galați, Faculty of Engineering and Agriculture, Research Center and Agriculture – Environment Consultance, 29, Calea Călărașilor Street, Brăila, Romania, Phone: 0239-612572, E-mail: moro6769@yahoo.com
[2]"Lucian Blaga" University of Sibiu, Faculty of Agricultural Sciences, Food Industry and Environmental Protection, 5-7 Ion Ratiu Street, 550003, Sibiu, Romania, Phone: +40269211338, Fax:+40213182888, Mobile:+40744472790, Email: mirela_stanciu2008@yahoo.com,
[3]The Maramures County Directorate for Agriculture, Baia Mare, 46 Gheorghe Sincai Street, 430311, Phone/Fax: 0262215046/0262213550, E-mail: dancocarca1968@yahoo.com
[4]University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Animal Sciences, 59 Mărăști Boulevard, District 1, Bucharest, 011464, Email:liviavidu@gmail.com, vladiul@yahoo.com

Corresponding author: mirela_stanciu2008@yahoo.com

Abstract

The paper presents data on the classification of pig carcasses in slaughterhouses in Romania during the period 2009-2015. The three authorized methods of classification are: Zwei Punkte (ZP) - a manual method using the ruler used by small slaughterhouses that sacrificed less than 200 pig on the average weekly in the previous year; semiautomatic methods using the optical probe used in large slaughterhouses: Optigrade Pro (OGP) and Fat-o-Meat'er (FOM). Data were collected from the classification inspectors, which were synthesized, processed and analyzed dynamically on: the number of classified carcasses, the weight of carcasses classified by the three methods, the average carcass weight evolution, the average thickness of the fat layer, the thickness of the muscle eye and the average percentage of meat in the carcass depending on the classification method used.

Key words**:** *pig, classification of carcasses, methods, slaughter indicators*

INTRODUCTION

Classification of carcasses is a set of techniques and methods of assessing as accurately as possible the quality of pig carcasses according to the three major components: meat, fat and bones.
Classification of carcasses has begun in Europe since the 1930s and 1950s, because the need for farmers to use a method to allow a fair payment for animals delivered to slaughterhouses, correlated with their quality.
Thus, a technical means has been put in place to differentiate the value of the carcasses according to objective criteria and has created the mechanism to allow farmers to obtain different pay, correlated with the result of carcass classifications. [1, 4]

The application of objective methods of classifying pig carcasses to bovine carcasses, for example, could have been implemented due to the specificity of this species. A fairly accurate estimation of the lean meat content in the carcass who can be made on pigs based on the measurement of the muscle eye and the fat (subcutaneous fat). Methods of classification of carcasses must be authorized and statistically confirmed, according to the EU regulation. [7, 8, 9]
Now the EU established a common framework for the classification of animals carcasses. Generraly carcass classification serves as a quality development tool to encourage the breeding of animals, from which it is possible to get high results and a better quality of carcasses, both for processors and consumers. [5]

In Romania the carcass classification started on 01.03.2016 according to the European classification system EUROP, based on the differentiation of carcasses and their classification in quality classes depending to the estimated percentage of lean meat. [2]
Classification of carcasses has different purposes: [10]
-provides a common point of references between animal producers, wholesalers and retailers of meat. An "E" classed carcass in Germany is equivalent to an "E" classed carcasses in Romania, or in Spain, or in any other Member State in terms of lean meat content;
-allow producers to be pay fairly on the basis of the quality of the pigs delivered to the slaughterhouse;
-allows trading partners to sell and buy carcasses without seeing them: distance trade;
-ensures fair competition between slaughterhouses;
-contribute to market transparency;
-is the basis for reporting prices to the European Commission;
-allows price comparisons between Member States;
-due to the intervention mechanism of the European Commission on the market there is a standardization: a unitary system of carcass appreciation
-helps producers, through feed-back information, to improve carcass quality;
-helps processors to sort raw material.
Classification of carcasses is compulsory in all slaughterhouses that sacrifice pigs. All carcasses with weighing between 50 and 120 kg are compulsory to be classified, excluding those from pigs used for breeding. [11]
The methods used for grading pig carcasses are the methods for prediction of lean meat content. For prediction of lean meat content, authorized methods are used. [5]
The approved method is based on the dissection of at least 120 carcasses (representative sample of the national porcine population). The error margin (standard error of the RMSEP prediction) of the lean meat prediction should be less than 2.5.

MATERIALS AND METHODS

Three methods are currently used in the slaughterhouses in Romania for the classification of pig carcasses and the data obtained are transmitted to the Commission for Classification of Carcasses.
The Zwei Punkte (ZP) classification method is a manual grading method that uses the ruler and is only allowed for the classification of pig carcasses in slaughterhouses with a lower capacity license. Under current legislation, this method only applies to slaughterhouses which slaughtered in the previous year below the average of 200 pig heads/week.
The Optigrade Pro (OGP) classification method is one of the semi-automated methods of classifying pig carcasses for grading in authorized abattoirs of higher capacity. According to the legislation in force, this method is applied in slaughterhouses that slaughtered over the average of 200 pigs heads /week in the previous year.
The Fat-o-Meat'er (FOM) optical grading method, along with the Optigrade Pro (OGP) method, is one of the semi-automated methods of classifying pig carcasses which is used for the classification of carcasses in higher-capacity slaughterhouses (which have sacrificed over the average of 200 pigs heads/week in the previous year).
The data for the years 2009-2015 provided by the classification agencies and the independent classifiers authorized to carry out the pig carcass classification were collected, processed and interpreted. These data refer to the number of pigs carcasses and their quality, as assessed by the three approved classification methods. The results were properly interpreted and illustrated graphically.

RESULTS AND DISCUSSIONS

As a result of analyzing the number of pigs carcasses classified in all slaughterhouses in Romania in the period 2009-2015 there was a constant increase of their number from year to year. With the exception of a single year of regression (2010) in which the number of carcasses registered a decrease compared to the

previous year, the number of classified carcasses in all the other years of the mentioned period increased continuously.

In 2010, the number of classified carcasses decreased by 140,342 carcasses compared to 2009, thus, in 2010, 2,713,020 carcasses were recorded compared to 2,853,362 carcasses in 2009. The percentage of the decrease was 4,9%.

One of the reasons for the decline in the number of classified carcasses may be that 2010 was the year who no financial support was given to producers in the pig breeding sector.

Since the beginning of the carcass classification in Romania according to the EUROP system until in 2010, a significant subsidy for the pigs was granted. This grant was granted to implement the classification activity. The grant of the subsidy and the amount there of were directly linked to the classification of pig carcasses delivered to authorized slaughterhouses.

Subsidies also aimed to improve the biological material and also pig breeding systems and technologies. The subsidy was granted in a differentiated amount only for carcasses classified in the "U" and "E" classes. For carcasses classified in lower quality grades, respectively "R", "O" and "P" no subsidy was granted.

Also in 2010, in the context of the international financial crisis, there has been a decrease in purchasing power and implicitly consumption of pork meat.

Since 2011, the financial support to the pig breeding sector has re-started. Subsidies have been granted to improve the conditions for breeding and exploitation and for the welfare of pigs. The financial support received by farmers was followed by a re-start of the upwarding trend in the number of slaughtered pigs in authorized slaughterhouses in Romania.

The dynamics of the number of pig carcasses classified during the period 2009-2015 based on the data reported in all slaughterhouses in Romania is presented in Figure 1.

The number of carcasses registered in slaughterhouses increased from 2,853,362 carcasses in 2009 to 4,086,643 carcasses in 2015, the difference being 1,233,281 carcasses and 43.2% respectively.

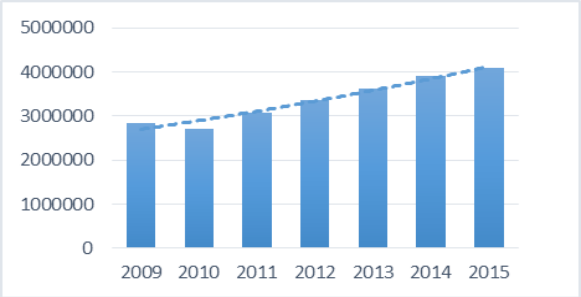

Fig. 1. Evolution of the number of pig carcasses classified in Romania between 2009 and 2015 (heads)
Source: own design based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

This significant increase in the number of carcasses classified in Romania is explained by the increase of the number of pigs raised in the country through the development of existing farms and the emergence of new breeding and fattening units (many of them being established by accessing European funds for the development of the agricultural sector).

An argument that supports the idea of the upward dynamics of the national pig breeding and fattening sector is the fact, that in 2009 in Romania there were classified 107,513 carcasses from fatty pigs from other countries representing 3.8% of the total carcasses, and in 2015 this number was 99,467 carcasses, that is, only 2.4%.

Comparative analysis of the carcass quality evolution determined by the three authorized methods. Study of the using of classification methods in the period 2009-2015

During the analyzed period, the weighting of the different classification methods used, from the total number of classified carcasses, varied from one year to the next according to Table 1 and Figure 2.

Table 1.The share of carcasses classified in Romania between 2009-2015 through the 3 authorized methods (%)

Method	2009	2010	2011	2012	2013	2014	2015
ZP	14.9	12.2	11	7.1	4.4	5.9	4.3
OGP	44.7	46	46.6	51.7	55.7	53.7	54
FOM	40.4	41.8	42.4	41.2	39.9	40.4	41.7

Source: own calculation, based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

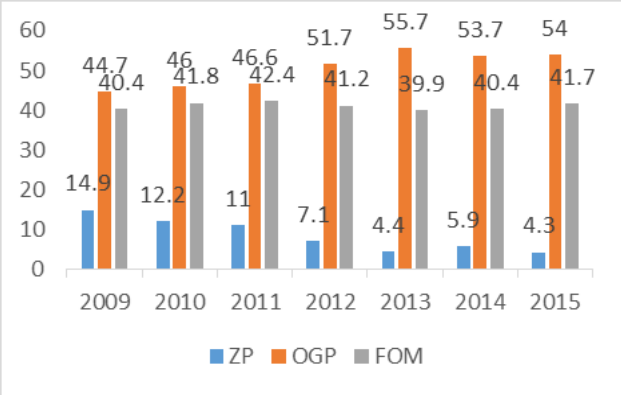

Fig. 2. The proportion of pig carcasses classified in Romania according to the method used (%)
Source: own design based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

Thus, the highest constant was recorded for the percentage of carcasses classified by the FOM method in the total classified carcasses, this percentage being around 40% (the lowest percentage being the one recorded in 2009 of 40,4% and the higher in 2011 of 42.4%).

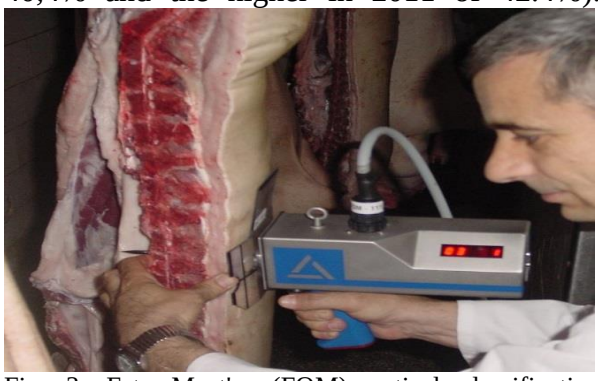

Fig. 3. Fat-o-Meat'er (FOM) optical classification method, 2016

Regarding the evolution of the quotas of the carcasses classified by the other two methods, there are observed larger differences over the analyzed period.
The OGP method has become increasingly widespread, increasing from a share of 44.7% of the total carcasses classified in 2009 to 54.0% in 2015, with the largest share being recorded in 2013, respectively 55.7%.
This increase in the weight of the carcasses classified by the OGP method was recorded against the background of the reduction of the percentage of those classified by the ZP manual method. The weight of the ZP-classified carcasses has steadily decreased during this period, from 14.9% in 2009 to just 4.3% of the total carcasses classified at national level in 2015.
This evolution was due to the fact, that in more and more slaughterhouses it was mandatory to replace the manual method of grading with a semi-automatic method due to the increase in the weekly average number of sacrificing pigs.
Of the two methods of classification with the authorized optical probe, the classification agencies and authorized independent classifiers have opted for the OGP method, probably because of its practical facilities: ease of classifying, mobility, and rapid processing of the measurements made

Fig. 4. Optigrade Pro (OGP) optical classification method, 2016

The comparative analysis of the evolution of the average weight of the carcasses classified by the three methods in the period 2009-2015

Evolution of average carcass weights in the study period shows, that the highest value is recorded in the FOM method, with over 80 kg, whereas for OGP and FOM methods the average weight was between 75.5 kg and 77.8 kg, according to Table 2 and Figure 5.
In case of all three methods it is shown an increase in the average carcass weights compared to the beginning of the analyzed period.
In the case of ZP and OGP methods, the carcass weight, as presented in the graph below, showed a certain uniformity over the analyzed period, while for the FOM method this parameter exhibits a greater variation from 80. 8 kg in 2009 to an average carcass weight of 87.8 kg in 2013.

Table 2. Evolution of the average weight of pig carcasses classified by the three methods, 2009-2015

Average carcass weight (kg)	2009	2010	2011	2012	2013	2014	2015
Method ZP	75.5	78.5	75	76.8	76	76.5	76.5
Method OGP	75.7	78	76.8	75.8	76.1	77	77.8
Method FOM	80.8	85.8	86	85.9	87.8	86	85.1

Source: own calculation, based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

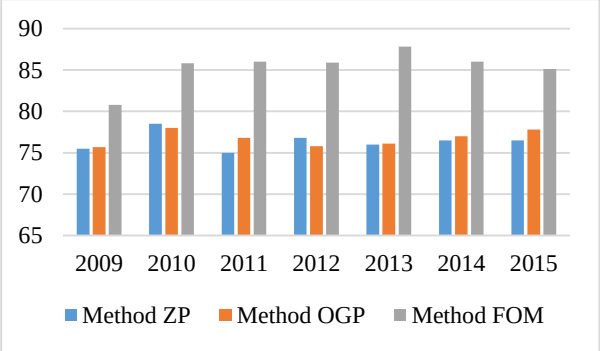

Fig. 5. Evolution of the average carcass weights according to the classification method (kg), in the period 2009-2015

Source: own design based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

Comparative analysis of the carcass quality according to the classification method used during the period 2009-2015

Comparative study of the carcass quality also involves the comparative analysis of the two indicators according to which, based on the calculation formulas, the percentage of lean meat, the thickness of the subcutaneous fat layer (bacon) and the muscle of the eye are estimated.

The situation of the data recorded by the three authorized methods regarding the average thickness of the bacon, expressed in millimeters, in the period 2009-2015 is presented in Table 3.

Also in this case, a similarity is observed with the evolution observed in case of weight analysis. Thus, the highest value is in this case also for FOM-rated carcasses with dimensions over 15 mm (between 15.2 mm in 2009 and 16.6 mm in 2013).

Also in terms of the uniformity in time of this indicator, the FOM method also recorded a greater variation from one year to the next, the difference between the minimum and the maximum being 1.4 mm.

Table 3. Average thickness of fat layer in pig carcasses, according to classification method (mm)

Average thickness of the fat (mm)	2009	2010	2011	2012	2013	2014	2015
Method ZP	13.4	14.2	13.5	13.3	13.1	12.9	13.2
Method OGP	14	14.6	14.4	14.1	14	13.5	13.3
Method FOM	15.2	16.3	16.2	16.1	16.6	15.9	15.2

Source: Source: Own calculation based on the statistical data from CCC EUROP.RO and Classification Agencies

For all methods. a tendency to improve during the last 3 years of the analyzed period was observed, in the direction of decreasing the thickness of the bacon.

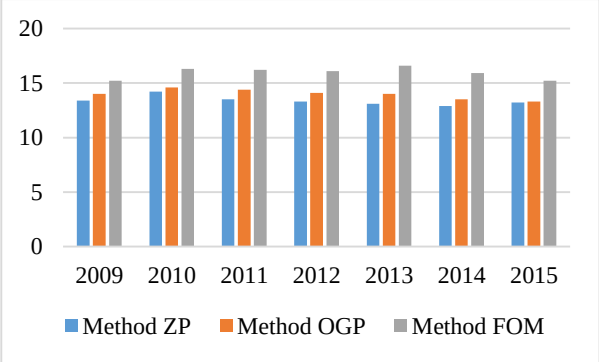

Fig. 6. Comparison of the average thickness of fat to the pig carcasses, according to the classification method, during 2009-2015

Source: own design based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

The second parameter measured and used to estimate the lean meat content of the carcass is the thickness of the muscle eye expressed in millimeters. The evolution of the thickness of the muscle eye according to the classification method used is presented in Table 4.

The muscle eye size has the highest mean value for the ZP method compared to the other two classification methods, in absolute values the differences being over 10 mm. This great difference in the size of the muscle eye determined by the ZP manual method compared to the two semi-automatic methods, with optical probe is explained by the fact that the manual method is used to measure the Gluteus medius muscle and in the case of the

other two methods, are used to measure the thickness of the Longissimus dorsi between the third and fourth last coast, at 7 cm from the midline.

Table 4. Evolution of the thickness of the muscle eye in pig carcasses (mm), between 2009-2015

	Year						
The thickness of the muscle eye (mm)	2009	2010	2011	2012	2013	2014	2015
Method ZP	68.8	69.1	69.1	67.5	69.2	69.2	67.8
Method OGP	57.7	57.7	57.4	58.7	59.6	59.2	59.1
Method FOM	57.9	58.5	59.8	60.6	61.6	62.6	60.8

Source: own calculation, based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

It is also noted for this parameter a continuous increase in quality in the case of methods of classification with the optical probe, FOM and OGP, the thickness of the muscle increasing from one year to the other, during the analyzed period.
In the case of the ZP method, the thickness of the muscle showed a certain non-uniformity, the lowest value being recorded in the middle of the analyzed time interval, 2012, also decreasing in the last year, 2015, compared to the previous years and the year 2009.

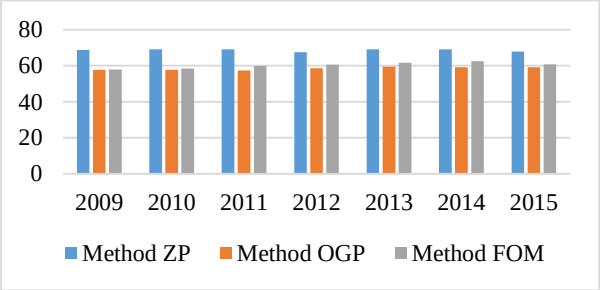

Fig. 7. Evolution of the thickness of the muscle in pig carcasses, according to the classification method, during 2009-2015
Source: own design based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

Finally, the study search at the evolution of carcass quality, the percentage of lean meat, estimated on the basis of the measurement of the two previously analyzed parameters, according to which the quality class are determined.

Fig. 8.The control of classification, 2016

The evolution of the average value of the percentage of lean meat in the carcass, according to the classification method analyzed over the period 2009-2015, is according to the data recorded by the slaughterhouse classifiers authorized, is presented in table 5.
Except for the last year of the analyzed period, it was noticed, that the highest percentage of lean meat in the carcass, and therefore the highest quality, was recorded each year for the ZP manual method.
In 2015, however, the carcasses classified by this method achieved the smallest percentage of lean meat compared to the other methods, the percentage being by 0.4 lower than those classified by the OGP method and by 0.6 against the FOM method.

Table 5. Evolution of the average value of lean meat in pig carcasses for the period 2009-2015

	Year						
The percentage of lean meat in pig carcasses	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Metoda ZP	59.6	59.1	59.6	59.3	59.9	60	59.5
Metoda OGP	59.1	58.7	58.8	59.2	59.5	59.8	59.9
Metoda FOM	59.6	58.7	59.1	59.3	59.2	59.9	60.1

Source: own calculation, based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

In the case of the two methods of optical probe classification, the data indicate a constant quality, the evolution of the lean meat percentage over time being approximating the same oscillations.

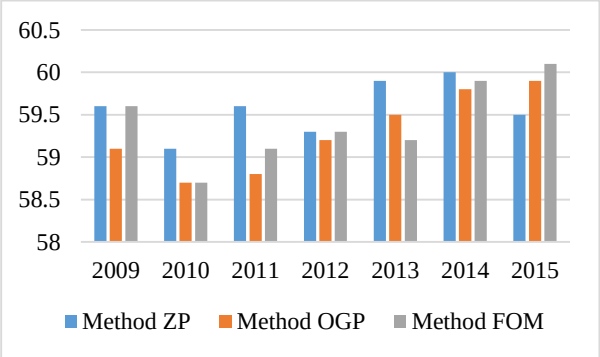

Fig. 9. Evolution of the average percentage of meat in the carcass by the classification method in the period 2009-2015
Source: own design based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

Although the average annual percentages of lean meat in those two methods are relatively close, there is a slight superiority in the quality determined by the FOM method over the PGI method, with the exception of 2013 (when a 59.5% in the case of the OGP method compared to 59.2% by the FOM method).

CONCLUSIONS

In Romania, the system of classification of pig carcasses, cattle and sheep was established in 2004, by governmental decision. [3]
The operation of the system is ensured by:
Carcass Classification Commission, Classification Agencies, Classifiers and Inspectors.
The Carcass Classification Commission manages the classification system and ensures its application. Classification of carcasses is carried out in slaughterhouses of independent classifiers or employees of classification agencies.
The Commission for Classification of Carcasses specifies the conditions under which the classification is made, licenses the classifiers and authorizes the functioning of the Classification Agency after it has been approved by ordinance to the Minister of Agriculture and Rural Development. The classification activity carried out in slaughterhouses is controlled by 10 regional inspectors for the classification of pig carcasses, cattle and sheep, coordinated by a chief inspector appointed by ministerial order.

REFERENCES

[1]Causeur, D., Daumas, G., Dhorne, T., Engel, B., Font, I., Fournols, M., Hojsgaard, S., 2003, Statistical handbook for assesing pig classification methods: Recommendations from the „EUPIGCLASS" project group. EC working document.
[2]Comisia de clasificare a carcaselor de porcine, bovine si ovine din Romania – Clasificarea carcaselor de porcine in Romania, http://www.ccceurop.ro, Accessed on August 28, 2017
[3]Commision Regulation (EEC) Nº 2967 / 85 of 24 October 1985, Laying down detailed rules for the application of the Community scale for grading pig carcasses. OJ L 285 of 25.10.1985, 39-40
[4]Commision Regulation (EC) Nº 3127/94 of 20 December 1994, Amending Regulation (EEC) Nº 2967/ 85 laying down detailed rules for the application of the Community scale for grading pig carcasses. OJ L 217 of 08.08.2006, 6-7.
[5]Council Regulation (EEC) Nº 3220/84 of 13 November 1984, Determining the Community scale for grading pig carcasses. OJ L 301 of 20.11.1984, 1-3.
[6]Găureanu, M.,, 2016, Cercetări privind uniformitatea clasificării carcaselor de porcine din România, în contextul dezvoltării sustenabile a sectorului porcin, Lucrare de disertație, Universitatea "Lucian Blaga" din Sibiu.
[7]Găureanu, M.E., Stanciu, M.A., Labă, M., 2014, Pig carcass classification in Romania: a dissection trial for the approval of the "Fat-o-Meat'er" and of the "Optigrade-Pro"equipment. Scientific Papers. Series "Management, Economic Engineering in Agriculture and rural development", Vol. 14(4):99-106.
[8]Jaba, E., Grama, A., 2004, Statistical Analysis with SPSS under Windows.
[9]Jansons, I., Strazdina, V., Anenkova, R., Pule, D., Skadule, I., Melece, L., 2016, Development of new pig carcasses classification formulas and changes in the lean meat content in Latvian pig population, Agronomy Research 14(x), xx–xx, Retrievde on 03.09.2017 from: http://www.bior.lv/sites/default/files/publikacijas/L_a_230_Development%20of%20new%20pig%20carcasses%20classification.pdf
[10]Ordin 839/2014 – aprobarea normelor tehnice de clasificare a carcaselor de porci, art 1 alin (2).
[11]Walstra, P., Merkus, G.S.M., 1996, Procedure for assessement of the lean meat percentage as a consequence of the new EU reference dissection method in pig carcass classification. Report ID-DLO 96.014.