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ANALYSIS OF CHANGES IN THE QUALITY CHARACTERISTICS OF GROWING-FINISHING PIGS OF COMMERCIAL PRODUCTION, RAISED IN EASTERN BULGARIA

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Abstract

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The study was carried out with 186 211 growing-finishing pigs of commercial production in eight pig producers in eastern Bulgaria (regions Shumen, Varna, Burgas and Ruse) and slaughtered in two slaughterhouses during the period from 2012 to 2015. The aim was to analyze the changes in the quality characteristics of pig carcasses. Using the carcass classification system SEUROP the value of pig carcasses raised. The lean meat percent was 56.01% and the weight of classified pig carcases was 84,588 kg for the studied period. The percentage of carcasses in Class E increased from 65.45% in 2012 to 76.49% in 2015, while those in classes U and R decreased by 13.89% and 0.89%, respectively. Carcasses from 70 kg to 99,9 kg occupied 91,8% of the study sample. The weight class 80 kg – 89.9 kg occupied the highest percentage – 44.26% followed by classes – 70 kg – 79.9 kg (25.42%) and 90 kg – 99.9 kg (22.12%).

Key words: pig carcass; SEUROP; lean meat; weight

Introduction

A market where the price is defined by the standard of carcass qualification plays a determining role in the right choice of the selection criteria in the pig breeding (Venev et al., 1998; Slanev and Apostolov, 1998).

In Bulgaria, the Regulation № 21-14th of May, 2004 of Ministry of agriculture and food (SG, №52-18th of July, 2004) has been effective since 1st of January, 2005 for carcass classification by the grade SEUROP. Lean meat percent and carcass weight are the controlled traits. Carcass classification is done by Hennessy Grading Probe (HGP) according to the Regulation.

According Regulation (EU) № 1249/2008 classification of pig carcasses in Bulgaria is performed with Ultra FOM 200. This required a change in the law and has been recorded in the Regulation №15 of Ministry of agriculture and food from 8th of May, 2009 (SG, № 37-19th of May, 2009) achieving complete synchronization with EU legislation.

In Bulgaria, the application of the classification by lean meat percent in carcass contributed for the better development of growing-finishing pigs of commercial production in relation with weight gain and carcass quality (Marinova et al., 2008; Nakev, 2010).

To ensure the effective operation of the system constant analysis and evaluation of the obtained results in meat producing companies has been required (Pulkrábek et al., 2003, 2011; V*í*tek et al., 2008; Kvapilík et al., 2009). According Savescu and Laba (2016) the accuracy of the system operation for carcass classification was of a great importance for a fair payment system of pigs' producers.

The aim of the study was to analyze the changes in the quality characteristics of growing-finishing pigs of commercial production raised in eastern Bulgaria during the period from 2012 to 2015.

Materials and Methods

The research has examined the quality characteristics of 186 211 growing-finishing pigs of commercial production in eight pig producers in eastern Bulgaria (regions Shumen,

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Varna, Burgas and Ruse) and slaughtered in two slaughterhouses during the period from 2012 to 2015. The experienced material was distributed as follows: 2012 – 55 812 pigs (29.97%), 2013 – 24 372 animals (13.09%), 2014 – 42 052 pigs (22.58%) and 2015 – 63 975 animals (34.36%).

Quality characteristics of slaughter carcasses were defined according Regulation №15/8th of May, 2009. The classification was made with Ultra FOM 200 as the lean meat percent was established by the following formula:

$$Y = 67.13 - 0.3284\ X_1 - 0.3725\ X_2 + 0.01515\ X_3,$$

where: Y – lean meat percent, (%); X_1 – back fat and thickness of skin, measured at 7 cm from midline of the carcass, between the third and fourth last lumbar vertebrae (mm); X_2 – back fat and thickness of skin, measured at 7 cm from the midline of the carcass, between the third and fourth last rib (mm); X_3 – thickness of MLD (musculus Longissimus dorsi) measured at point X_2.

The establishment of the carcass weight was performed till 45 minutes after slaughter within 0.01 kg of the kilos required. The studied sample was distributed in the following weight classes (kg) – < 60; 60-69.9; 70-79.9; 80-89.9; 90-99.9 >100 for precise the weight structure.

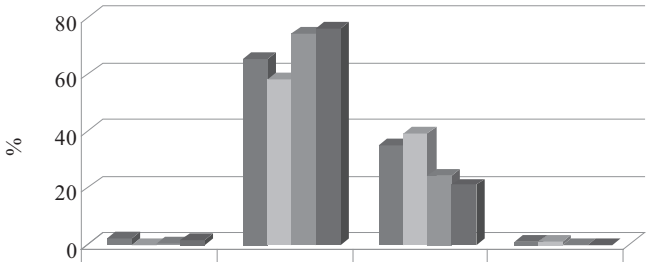
The obtained results were worked out by the methods of the variation statistic (JMP v.13).

Results and Discussions

The main quality characteristics of growing-finishing pigs of commercial production during the period 2012 – 2015 are shown in Table 1. The lean meat percent for the studied period is 56.01%. The average weight of classified pig carcasses is 84.588 kg. The results showed significant differences in carcass weight within individual classes of system SEUROP. Carcasses with high lean meat percent in the body are characterized by lower weight ($P \leq 0{,}001$). The established value for the trait weight of cooled carcass is 78.350 kg in class S, which is with 5.25 kg, 8.80 kg, 14.53 kg and 15.31 kg less than those in the classes E, U, R and O ($P \leq 0.001$). Carcasses from class E are lighter than those in classes U, R and O with 3.55 kg, 9.28 kg and 10.05 kg, respectively. Classified pig carcasses in class E occupy 69.20%, followed by those in class U – 28.50%, S – 1.64%, R – 0.63% and O – 0.02%. Our results differ from those of Čandek-Potokar et. al. (2004) and Pulkrábek et. al. (2011). The differences are due to the fact that the class S in our study occupies low percent of the sample.

An insignificant increase of pig carcasses has been established in Class S and decrease in classes U and R with 13.89% and 0.89%, respectively through the years of our research (Figure 1). The percentage of Class E has increased from 65.45% in 2012 to 76.49% in 2015.

The analysis of quality characteristics in different weight classes (Table 2) showed insignificant differences in the carcasses' weight in the class. The variation coefficient is in the range from 2.87% to 3.67%. Classified by system SEUROP, carcasses weighing 99,9 kg are classified in class E as the lean meat percent decreased from 57.28% (<60 kg) up to 55.49% (90 kg – 99.9 kg). Sencic et. al. (2005) reported similar results establishing decrease of the lean meat percent as follows: 58.13%; 57.73%; 55.36%; 54.93% and 53.80% in five weight groups with increasing live weight – 90.30 kg;



	S	E	U	R
2012	2.28	65.45	35.12	1.1
2013	0.34	58.49	39.64	1.48
2014	0.93	74.58	24.32	0.15
2015	2.04	76.49	21.23	0.21

Fig. 1. Distribution of carcasses in classes lean meat

Table 1
Weight and lean meat percent in carcasses from different classes by SEUROP

Traits		Number	Weight carcass, kg				Lean meat percent, %		
		n	$\bar{x}$	C	E	t-test	$\bar{x}$	C	E
Class	S	3055	78.35	9.92	0.18	1-[2;3;4;5]***	61.41	2.27	0.04
	E	128867	83.603	10.11	0.03	2-[3;4;5]***	56.91	2.09	0.01
	U	53077	87.149	9.68	0.04	3-[4;5]***	53.7	2.07	0.01
	R	1182	92.878	10.1	0.3		48.82	2.21	0.06
	O	30	93.655	10.71	1.96		43.31	3.41	0.62
Total		186211	84.588	10.23	0.02		56.01	3.69	0.01

Table 2
Weight and lean meat percent in carcasses from different weight classes

Traits		Number	Weght carcass, kg			Lean meat percent, %			
		n	$\bar{x}$	C	E	$\bar{x}$	C	E	t-test
Weight kg	< 60	264	57.893	3.63	0.22	57.28	3.39	0.21	1-2*
	60-69.9	7819	67.059	3.56	0.04	57.03	3.5	0.04	1-[3;4;5;6]***
	70-79.9	47336	75.842	3.63	0.02	56.54	3.57	0.02	2-[3;4;5;6]***
	80-89.9	82419	85.028	3.29	0.01	55.98	3.46	0.01	3-[4;5;6]***
	90-99.9	51198	93.853	2.87	0.01	55.49	3.74	0.02	4-[5;6]***
	>100	7175	104.118	3.67	0.04	54.73	4.34	0.05	5-6***
Total		186211	84.588	10.23	0.02	56.01	3.69	0.01	

100.40 kg; 110.30 kg; 120.50 kg and 130.20 kg, respectively. Pulkrábek et. al., (2011) established carcass weight 89.14 kg, 87.66 kg, 86.68 kg. and 90.89 kg and lean meat percent 55.05%, 54.64%, 55.60% and 56.33%, in a study of four subgroups – I – 9.502, II – 31.610, III – 9.679 and IV – 15.311 growing-finishing pigs slaughtered in 1995, 2001, 2005 and 2010. The weight class 80 kg – 89,9 kg holds 44.26% and altogether with classes – 70 kg – 79.9 kg (25.42%) and 90 kg – 99.9 kg (22.12%), represent 91.8% of the study sample (Figure 2).

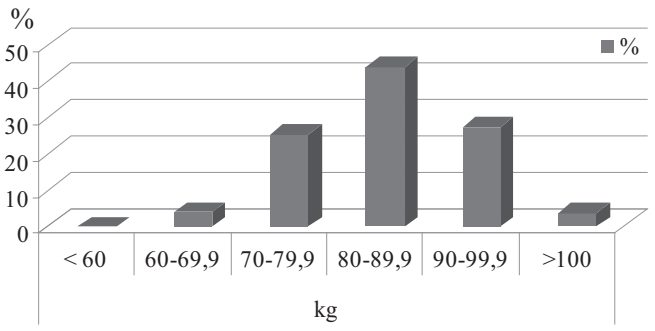


Fig. 2. Distribution of carcases by weight classes

The results showed a stimulated commercial production of growing-finishing pigs with higher quality applying the classification system. According to Hansson (2003) in Bulgaria the lean meat percentage was 45% and carcass weight – 70 kg in 2001. Karamanov (1996) reported that in PLC "Hybrid Center of pig breeding" – Shumen when grown in nucleus Large White and English Landrace populations, the lean meat percent in males was from 52% to 54% and in females – from 48% to 50%. Marinova et al. (2008) established that the carcass weight of the test animals was 81.64 kg in a study, made with 1865 steamed carcasses raised in Razgrad, Targovishte and Plovdiv regions during the period 2006 – 2007. Animals from Danbred breed are characterized with the highest lean meat percent (54.19%), maximum thickness for m. Longissimus dorsi (54.53 mm) and the smallest thickness of the back fat. Nakev (2010) found that classified pig carcasses in the country in 2009 were characterized with 56.72% of lean meat and 76.80 kg cold weight. Class E occupy 76.51%, followed by those in Class U – 17.70% and Class S – 5.05%.

The established qualitative characteristics of the carcass in our study did not differ significantly from those established in the countries of Eastern Europe. In Slovenia, for a period of eight years (1996-2004) the lean meat percentage has increased from 51.9% to 55.9% and the share of carcasses belonging to Class S and Class E has increased with 21.3% and 58.2%, respectively (Čandek-Potokar, 2004). Skrzymowska (2012) reported that in Poland in 2009 there were produced 1.71 million tons of growing-finishing pigs of commercial production as the main characteristics of the carcasses were 88.5 kg weight and 54.6% lean meat. Production in 2012 grew to 1.86 million tons, while the average weight and the lean meat percent were 87.5 kg and 55.4% respectively. Having assessed the quality of growing-finishing pigs'carcasses produced in the south-eastern part of the Lublin Voivodeship (Poland) Szostak (2013) established lean meat percent from 56.6% to 58.3% as classes S and E have occupied 93% of sample. Kvapilik et al. (2009) established that in the Czech Republic the average carcass weight was 87.21 kg in an experiment carried out with 7571883 pig carcasses for the period 2004 – 2007. According to the authors carcasses weighing 70 kg to 79.9 kg were 19.9%, while those in the weight range of 80 kg – 89.9 kg and 90 kg – 99.9 kg are 36% and 27.1% respectively.

According Castryck (2007), in Belgium the average lean meat percent is 59.93% as 51.69% of classified pigs are in Class S and those of classes E and U – 42.73% and 5.62%, respectively.

The established qualitative characteristics of the carcass in our study did not differ significantly from those estab-

lished in the countries of Eastern Europe, but significantly gave way to those in Western European countries.

Conclusions

The lean meat percent was 56.01% and the weight of classified pig carcases was 84.588 kg for the studied period. The percentage of carcasses in Class E increased from 65.45% in 2012 to 76.49% in 2015, while those in classes U and R decreased by 13.89% and 0.89%, respectively. Carcasses from 70 kg to 99.9 kg occupied 91.8% of the study sample. The weight class 80 kg – 89.9 kg occupied the highest percentage – 44.26% followed by classes – 70 kg – 79.9 kg (25.42%) and 90 kg – 99.9 kg (22.12%).

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