

# IMPORTANCE OF THE QUALITY OF PIG CARCASS SIDES FOR ECONOMICAL EFFICIENCY IN PRODUCTION AND PROCESSING OF PORK \*\*

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**Abstract:** Intensive, market oriented pork and pork meat production requires detailed view of production prices, besides required quality and production parameters. This is required for meat-by products production to be economic in later phases.

Previous results show that production price of fatteners does not vary during the year (around 1 €/kg) because feed price does not vary significantly. During the year supply and demand may change, so the price of fatteners changes. In conclusion, the position of live stock and meat producers is insecure and slaughterhouses supply with livestock and market with meat is unstable.

The paper presents results of sides' quantitative parameters testing, economic analysis of profitability of supply of carcass sides according to quality and meat yield. Meat yield, basic parts and tissues in carcass sides was determined using partial dissection method. For economic analysis, divisional calculation was used. Base for cost distribution were relations between market prices of different meat categories and slaughter and pork meat processing costs in second phase of calculation.

Carcass sides' weight was around 83kg. Average meat percentage was 47,96%, and it ranged from 42,5% (class O) to 52,2% (class U).

Knowing that same production requirements are needed for both bad and good quality pigs, it is essential to stimulate fatteners' producers by paying for meat percentage using and classifying carcass sides on the pig slaughter line.

Livestock producers can achieve greater price and adequate compensation for quality work on selection, choice of food, optimal fattening ending... At the same time producers of meat and meat by products, although they pay more for raw materials, they get better quality, more meat, and better economic effect. Customers are rewarded with better quality.

**Key words:** Production of pork meat, carcass side quality, costs

## Introduction

Quantity represents still very important element of production since it reflects long lasting attempt to provide necessary quantities of meat, although its importance has been superseded. So, in developed part of the World there is concordance in relation to much defined attitude that quality is of primary importance and represents competitive advantage, whereas the quantity is only one of the integral elements of the quality (*Radovanović, 2001*). Based on evaluation of the quality of carcass/carcass side the entire effort and work in the field of genetics, selection/breeding, nutrition, reproduction and health care, as well as technology of slaughtering of livestock, primary processing of carcasses/carcass sides and processing of meat are valued (*Radovanović, 1992*).

Procedure for evaluation of the quality of carcass and meat on slaughter line represents very important link in specific chain of meat production and processing. On one hand, determination of the quality of carcasses and meat gives basis for optimal utilization of raw material by directing carcasses (meat) to further processing in accordance with established properties. At the same time, in this way, results of numerous activities in selection and breeding of pigs are demonstrated, and evaluation of carcasses enables better valorisation of pigs through higher process for better quality (*Manojlović et al., 1999*).

In the process of quality assessment it is necessary to realize adequate speed of evaluation which can follow the usual work dynamics in the plant. In this way, data established on slaughter line can immediately be processed and recorded using PC (*Petrović et al., 1999*).

Production of pork makes one third of total meat production in Serbia (in Vojvodina almost one half). In intensive, market oriented production of pigs and pork, it is very important to provide adequate quality and production parameters but also detailed insight into production costs, since this represents the basis of economically efficient process of pork processing in later stages of production (*Zekić et al. 2007.*).

Study of economical parameters of production of pork deals with determination of the cost of produced meat. Purpose of the cost adjustment is to

provide broad applicability to obtained results in relation to investigated farm. In this way obtained results have general and not only local importance (*Andrić, 1998; Jovanović et al., 1998*).

Based on previously published results (*Zekić et al. 2007.; 2007a*) it is known that production price of fattening pigs is rather unified during entire year (86,49 din/kg or approx. 1€/kg of live weight, i.e. 112,28din/kg or 1,32€/kg of carcass side) since price of livestock feed doesn't change considerably. During the year demand and supply of fatteners varies, therefore market price of fatteners is variable. Therefore we can conclude that position of producers of livestock and meat is rather uncertain, and supply of slaughterhouses with fatteners and supply of market with meat unstable.

Since one of the main causes of this occurrence is undefined economical relation between breeders and processors, and in order to put this in order, first task would be to apply existing regulations on classification of carcass sides and meat for processing, and harmonize them with EU regulations, it was decided that in this paper certain market effects of classification of pork in carcass sides of deboned meat for processing are presented.

## Material and methods

Investigation of the quality of carcass sides cutting and deboning of carcass sides, sorting of meat for processing was performed in processing plant of company "Carnex", on pig carcass sides originating from pig farm which operates within the Meat Industry „Carnex“ in Vrbas.

Meat yield in carcass sides was determined by two point/spot method on warm carcass sides, using mathematical model defined by *Džinić et al. (2004)*:

$$Y = 67,098 - 0,505X_1 - 0,14X_2$$

$X_1$  = fat tissue thickness (with skin) in millimetres, measured in medial carcass side surface, between 3. and 4. lumbal vertebrae, from caudal-cranial perspective,

$X_2$  = fat tissue thickness (with skin) in millimetres, measured in medial carcass side surface, between 3. and 4. rib, from caudal-cranial perspective,

Based on determined percentage of meat, pig carcass sides were classified in six commercial classes/grades (SEUROP) according to following scale (*Council Regulation (EEC) No 3220/84..., 1984*): · S ≥ 60; · 55 ≤ E < 60; · 50 ≤ U < 55; · 45 ≤ R < 50; · 40 ≤ O < 45; · P < 40.

For further cutting 13 carcass sides were selected (three of O, six of R and four of U class). Cutting of carcass sides, i.e. determination of the share of main anatomy parts of carcass side was done according to procedure which is

main component of the Regulation - *Pravilnik (1985)*. Subsequent to determination of mass of obtained parts of carcass side, leg, shoulder, belly-rib, loin, neck head and ribs were deboned.

From each main anatomy part which was deboned, carefully fat tissue was removed with skin, then groups of muscles and soft fat tissue separated. Separated leg and shoulder muscles were further grouped based on visual assessment into adequate categories. Belly-rib part, loin, neck, head muscle tissue and ribs were processed in the following way: from main parts deboned and skin with fat tissue, cuts of meat and fat were removed and included with adequate category of meat or fat tissue, and main part, according to visual assessment of meat and binding tissue, was classified in its entirety in adequate meat category.

Categorization of meat was done according to Regulation - *Pravilnik (2004)*, and partly according to proposition for the correction (2006) of existing procedure for categorization of pork for processing in the following way: I category up to 5%, II category up to 10%, III category up to 20%, IV category up to 35%, V category up to 50% of accompanying fat tissue and VI category – meat with accompanying fat and binding tissue (meat from heads, forearm and shank).

By deboning of main parts and further cutting and classifying of meat for processing into 6 classes/grades, the following was obtained: skin with fat tissue, soft fat tissue (with kidney fat), bloody meat, bones and parts which weren't deboned (forearm, shank, feet and tail). Shares of obtained meat categorized in 6 grades, of other tissues and parts were calculated in relation to mass of chilled carcass side (100 %) obtained by adding of masses of main carcass side parts after cutting.

Economical analysis of the value of carcass sides of certain classes/grades (U, R, O) was performed by calculation of results obtained by cutting of investigated sample in relation to fattener of 100 kg. Calculation of the value of carcass sides was done by determination of coefficients of the value of certain categories of meat and accompanying parts, and by comparison of results between established carcass side classes/grades.

## Results and discussion

In table 1, results of measuring of the mass of warm and chilled carcass sides, fat tissue thickness on two locations (spots/points) are presented and based on this data meat yield, i.e. class of carcass sides were determined.

Average body mass of warm carcass sides was 83,38 kg, and it varied from 74,8 to 90 kg. Subsequent to cooling and loss of mass of 2,71%, average mass of carcass sides was 81,18 kg. Thickness of fat tissue with skin measured

in medial surface, between 3. and 4. lumbal vertebrae, from caudal-cranial perspective, varied between 24 and 37 mm, and thickness of fat tissue with skin measured in medial surface, between 3. and 4. rib, from caudal-cranial perspective, varied from 22 to 35 mm.

Average meat yield in selected carcass sides, determined by method of two locations (points/spots) (*Džinić et al. 2004*), was 47,96 % (R class/grade), and it varied from 42,5 (O class/grade) to 52,2 % (U class/grade).

In table 2, results of the economical analysis of the value of pig carcass sides of different quality subsequent to cutting, deboning and sorting into six categories are presented.

**Tabela 1. Prinos mesa i klasa odabranih polutki određena metodom dve tačke**  
**Table 1. Meat yield and class in selected carcasses determined by two point method**

R. br. polutke, Number of carcass	Masa toplog trupa, Mass of warm carcass (kg)	Masa trupa ohlađenog, Mass of chilled carcass (kg)	Debljina masnog tkiva, Thickness of fatty tissue (mm)		Prinos mesa, Meat yield, (mm)	Klasa polutke, Class of halves
			X <sub>1</sub>	X <sub>2</sub>		
1	80,0	78,2	28	27	49,2	R
2	90,0	87,4	25	18	51,9	U
3	87,0	84,6	25	28	50,6	U
4	80,0	75,6	30	22	48,9	R
5	77,0	74,6	35	26	45,8	R
6	84,0	81,8	30	22	48,9	R
7	84,6	82,9	32	23	47,7	R
8	80,2	78,4	24	20	52,2	U
9	83,2	81,4	39	35	42,5	O
10	88,2	86,2	35	28	45,5	R
11	74,8	73,0	24	23	51,8	U
12	86,5	84,8	37	31	44,1	O
13	88,5	86,4	37	29	44,4	O
$\bar{X}$	<b>83,38</b>	<b>81,18</b>	<b>30,85</b>	<b>25,54</b>	<b>47,96</b>	<b>R</b>
Sd	<b>4,70</b>	<b>4,81</b>	<b>5,40</b>	<b>4,75</b>	<b>3,25</b>	-

Obtained quantities of certain meat categories (and other carcass side parts) are increased by quality coefficients. We come to expected conclusion: carcass sides of U class/grade are the most valuable (165,92), and exceed carcass sides of R class/grade (154,78), and are considerably more valuable than carcass sides of o class/grade (143,33). If we consider the cost of fattening

which are the same for pigs of better and poorer quality (approx. 100 €/piece), it is clear that both pig producers and slaughter industry have economical justification for investment of extra effort to obtain pigs of better quality.

Since cost of production of pigs of good and not so good quality is the same, it can be concluded that incentives for producers are of essential importance or payments for pigs according to meat yield by assessment of warm carcass side on slaughter line. In this way livestock producers can have much higher price for produced fatteners, and realize adequate compensation for invested high quality work during selection/breeding, decisions relating to nutrition, optimal fattening finalization ... producers of meat and meat products would pay for the raw material according to its true value and obtain better quality, more meat, better economical effect, and consumers would be rewarded with better quality of end product.

**Tabela 2. Prosečan relativan prinos mesa po kategorijama, drugih tkiva i delova u rasecanim polutkama i vrednost polutki u €**

**Table 2. Yield of meat, other tissues and parts of halves and value of halves (€)**

Kategorije mesa, Meat categories	Klasa polutki, Class of halves								
	U (n=4)			R (n=6)			O (n=3)		
	%	€	€		€	€		€	€
I kategorija, I category	22,68	3,00	68,04	20,68	3,00	62,04	17,58	3,00	52,74
II kategorija, II category	11,13	2,50	27,83	8,85	2,50	22,13	7,68	2,50	19,20
III kategorija, III category	12,46	2,20	27,41	7,78	2,20	17,12	5,88	2,20	12,94
IV kategorija, IV category	7,73	1,90	14,69	8,91	1,90	16,93	8,33	1,90	15,83
V kategorija, V category	2,62	1,50	3,93	6,03	1,50	9,05	7,58	1,50	11,37
VI kategorija, VI category	3,12	1,00	3,12	4,14	1,00	4,14	3,38	1,00	3,38
Krvavo meso, Bloody meat	0,56	2,00	1,12	0,48	2,00	0,96	0,81	2,00	1,62
Σ	60,30			56,87			51,24		
Koža i masno tkivo, Skin and fat tissue	16,60	0,70	11,62	19,68	0,70	13,78	24,69	0,70	17,28
Meko masno tkivo, Soft fat tissue	1,40	0,65	0,91	2,25	0,65	1,46	3,15	0,65	2,05
Podlaktica/kolenica, Shanks	5,19	1,00	5,19	5,13	1,00	5,13	5,09	1,00	5,09
Nogice, feet	2,29	0,25	0,57	2,18	0,25	0,55	1,76	0,25	0,44
Rep i krsna kost, Tail and cross bone	0,52	0,40	0,21	0,76	0,40	0,30	0,34	0,40	0,14
Kosti, Bones	12,90	0,10	1,29	12,06	0,10	1,21	12,59	0,10	1,26
Rastur, Wastage	0,80		0,00	1,07		0,00	1,14		0,00
	100,00		165,92	100,00		154,78	100,00		143,33

## Conclusion

Carcass sides of all classes (if not classified) prior to cutting have same value calculated on basis of 100 kg.

By determination of carcass side classes and establishment of yields of certain meat categories for processing, increased by coefficient of the quality of carcass side it was established that carcass sides of U class/grade are the most valuable (165,92), and exceed carcass sides of R class/grade (154,78), and are considerably more valuable than carcass sides of O class/grade (143,33 EUR).

Economical analysis is once again argument of essential importance for progress of livestock production in general, incentives for producers of fatteners, i.e. payment according to meat yield.

**Everybody is rewarded for quality work.**

## Značaj kvaliteta svinjskih polutki za ekonomiku poslovanja u proizvodnji i preradi svinjskog mesa

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### Rezime

U intenzivnoj, tržišno orijentisanoj proizvodnji svinja i svinjskog mesa, veoma je bitno da se pored adekvatnih proizvodnih pokazatelja i kvaliteta mesa obezbedi detaljan uvid u troškove proizvodnje.

U radu su prikazani rezultati ispitivanja kvaliteta svinjskih polutki i njihove valorizacije kroz klasirano meso za preradu. Data je ekonomska analiza isplativosti plasmana svinjskih polutki prema kvalitetu (SEUROP), odnosno prema prinosu (%) mesa, a nakon otkoštavanja razvrstanog na kategorije. Prinos mesa u polutkama određen je metodom dve tačke, a udeo osnovnih delova i tkiva u polutkama, odnosno klasiranog mesa za preradu prema važećim Pravilnicima. Za ekonomsku analizu je korišten odnos između tržišnih cena pojedinih kategorija mesa i normativa troškova klanja i obrade svinjskog mesa.

Masa polutki je bila oko 83 kg, a procenat mesa u polutkama u proseku je bio 47,96%, a kretao se od 42,5 (O klasa) do 52,2% (U klasa).

Znajući da je skoro istovetno angažovanje sredstava za proizvodnju svinja i lošeg i dobrog kvaliteta, analizom dobijenih rezultata zaključeno je, da je od presudnog značaja stimulacija proizvođača tovljenika, odnosno plaćanje svinja prema prinosu mesa, ocenom tople polutke na liniji klanja svinja. Na taj način proizvođači stoke mogu da ostvare značajno veću cenu za proizvedene tovljenike, odnosno da ostvare adekvatnu nadoknadu za uloženi kvalitetan rad prilikom selekcije, izbora hrane, optimalnog završetka tova... Istovremeno proizvođači mesa i proizvoda od mesa, sirovinu plaćaju prema stvarnoj vrednosti, dobijaju bolji kvalitet, više mesa, bolji ekonomski efekat, a potrošači su nagrađeni boljim kvalitetom proizvoda, a i korektnijom cenom koja bi pratila kvalitet proizvoda.

**Ključne reči:** Proizvodnja svinjskog mesa, kvalitet polutke, troškovi

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