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STUDY ON THE EFFECT OF LEAN MEAT CONTENT ON COMMERCIAL VALUE OF PORCINE CARCASSES

Summary. The aim of the study was to investigate the effect of fleshing of fatteners on their commercial value, calculated on the basis of the total manufacturing costs for elements from cutting and trimming of halfcarcasses in a large meat processing plant. Analyses were conducted in 2009 on 327 porcine carcasses, divided into 16 groups with leanness ranging from 45 to 60%, each differing by 1% in the meat content. It was found that the index of carcass value increment, defining an increase in the value of 1 kg carcass at leanness increased by 1%, was 2.82 grosz in case of cutting and 7.32 grosz in case of trimming of elements from halfcarcasses. In order to increase this index in case of cutting to the level comparable to that of trimming it is necessary to differentiate purchase prices for cuts according to the EUROP classification. The recorded differing indexes of value increments for individual elements of halfcarcasses confirm the finding that in the selection of genotype for fattening the focus should be on the high proportion of the hindquarter (indexes of 5.13, 7.38 and 9.25 gr/%/kg for the forequarter, middles and the hindquarter).

Key words: porcine carcass, leanness, commercial value

Introduction

The objective of every fattener producer is to receive maximum profits from their production, which also results from the general laws of capitalist economy. This is provided by minimization of production costs or by the manufacture of a product of the highest commercial value, most frequently using both these measures at the same time. Minimization of production costs applies to many of its aspects, e.g. feeding, genetic selection, keeping technology, veterinary prevention measures, etc., which constitute a separate field in production of slaughter animals, extensively studied for many years now. This field is not within the scope of immediate interest of meat industry, which

strives to obtain from farmers the processing material of the highest possible slaughter value and meat quality. Efforts of farmers trying to produce cheap fatteners of inferior quality are fruitless, since they will not be paid good prices for such slaughter material. The point is to produce slaughter animals of high processability at low outlays.

Value of slaughter animals is to a considerable degree dependent on the proportions of individual anatomical parts and on the tissue composition of their carcasses. This problem has been long investigated by numerous authors (STRZELECKI et AL. 1997, BORZUTA 1998, GAJEWCZYK et AL. 2008, NOWACHOWICZ et AL. 2007, 2008, 2009). It was shown that the value of the carcass is determined to the highest degree by the content of meat, which is the basic raw material obtained when purchasing slaughter animals to be used in retail or processing (STRZELECKI et AL. 1997, BORZUTA 1998). Meat content is connected directly with the composition of carcass cuts. The higher the meat content, the higher the proportion of primal cuts with high meatiness, e.g. ham, loin or shoulder (BORZUTA 1998, NOWACHOWICZ et AL. 2007, NOWACHOWICZ 2009). In studies conducted at the Division of Meat and Fat Technology on the population of fatteners from the bulk population of the 1990's showed that an increment in meat content by 1% results in an increased commercial value of carcasses by 2 gr/kg in case of cutting and by 5 gr/kg in case of trimming of primal parts (STRZELECKI et AL. 1997). Studies were conducted on the population with mean leanness of approximately 47% and mean carcass weight of approximately 80 kg. At present slaughter value of fatteners from the bulk population has undergone significant changes. Mean meat content in Polish fatteners in 2009 was 54.5%, while the mean carcass weight was 88.6 kg (LISIAK and BORZUTA 2009). The proportion of high meat producing breeds and their crosses has been increasing, which also affects their carcass tissue composition and proportions of their body composition. It was found that high meat producing breeds are characterized by a high share of the most valuable elements (GRZEŚKOWIAK et AL. 1998, 2003). A significant factor having an immediate effect on the commercial value of carcasses is related to the prices of the raw material, which have also been changing. The above circumstances confirm that it is advisable to analyse the commercial value of carcasses in view of the current status of the market and raw material base.

The aim of the study was to investigate the effect of leanness of fatteners on their commercial value taking into consideration the current market situation.

Material and methods

The raw material for the study comprised fatteners from a one-week slaughter period, originating from the raw material base of one of the plants in north-western Poland. Investigations were conducted in the winter period in 2009. A total of 16 groups of carcasses with leanness levels ranging from 45 to 60%, differing in leanness by 1%, were selected at the slaughter line of this plant. Leanness was estimated using an optical needle CGM-Sydel apparatus, equipped with the current regression equation (BORZUTA et AL. 2004). Slaughter weight of selected carcasses ranged from 85 to 95 kg. A total of 327 carcasses in groups with population sizes given in Table 1 were selected for analyses.

After cooling carcasses were weighed and subjected to wholesale cutting into primal cuts and trimming elements. Only left halfcarcasses were cut, with the Polish Standard

Table 1. Percentage composition of main pork halfcarcass cuts in experimental groups of fatteners with different level of meatiness

Tabela 1. Procentowy skład głównych wyrębów półtuszy wieprzowej w grupach doświadczalnych tuczników różniących się poziomem zawartości mięsa

Meati-ness (%)	Number of pigs	Shoulder with shank	Neck with bone	Jowl	Loin with bone	Narrow ribs	Belly with ribs	Ham with shank	Tender-loin	Backfat without skin
45	9	16.64	7.19	4.10	9.15	1.95	12.25	26.47	1.42	12.63
46	18	17.16	7.33	3.72	9.45	1.88	11.87	26.53	1.47	13.07
47	21	16.71	7.54	3.79	9.44	1.99	11.43	27.22	1.48	12.18
48	23	16.98	7.21	3.47	9.55	1.93	12.45	26.99	1.41	12.23
49	19	17.61	7.29	3.37	9.72	1.99	12.52	27.22	1.46	11.48
50	25	17.42	7.46	3.49	9.96	1.94	11.98	27.43	1.50	10.87
51	24	17.40	7.50	3.46	10.24	2.07	12.21	27.02	1.54	10.53
52	19	17.51	7.62	3.44	10.07	1.91	11.99	27.48	1.56	10.20
53	19	17.99	7.33	3.19	10.96	2.13	11.89	27.65	1.56	9.31
54	22	17.79	7.63	3.42	10.60	2.13	12.32	27.40	1.60	8.42
55	24	17.69	7.59	2.93	10.76	2.12	12.09	27.78	1.61	8.75
56	20	17.92	7.51	3.21	11.05	2.05	12.12	27.97	1.63	7.06
57	22	17.65	7.79	3.12	10.97	2.10	11.63	28.86	1.64	7.30
58	21	18.10	7.58	2.70	11.33	2.16	11.61	28.91	1.70	6.59
59	17	18.18	7.80	2.76	11.27	2.15	11.53	28.82	1.65	6.48
60	24	17.52	7.80	2.84	11.75	2.03	11.50	29.29	1.70	5.68
SEM	–	1.02	0.51	0.57	0.87	0.22	0.87	1.02	0.13	1.69
Test F	–	3.19[xx]	2.68[xx]	7.61[xx]	13.72[xx]	3.26[x]	3.12[xx]	14.10[xx]	10.00[xx]	38.30[xx]

[x] – significant at $P \leq 0.05$.

[xx] – significant at $P \leq 0.01$.

requirements being applied (PN-86/A-82002 1986). Trimming of primal cuts was performed following plant internal standards dividing them into groups of muscles, fine processing meat of grades 1 to 4, hard and soft fat, skin and bones. All elements obtained from cutting and trimming were weighed accurate to 1 g.

Material recorded from measurements was verified and analyzed statistically. Commercial value of carcasses and elements was calculated using plant prices from the last week of March 2009, assuming the so-called total manufacturing cost, i.e. TMC (Table 7). Means and standard deviations (SEM) were calculated and the analysis of variance was conducted for the uneven number of representatives in the groups (RUSZCZYC 1991).

Results

The level of leanness in porcine carcasses had a highly significant effect on the proportions of all primal cuts, which results from the data presented in Table 1. With an increase in meat content in the carcass the percentages of meat cuts (ham, shoulder, loin, tenderloin, ribs) increased, while the share of fat cuts (lard, jowl, belly) decreased. Similar dependencies were found when trimming cuts into elements of processing meat, which results are the subject of a separate publication (LISIAK et AL. 2010).

Table 2 presents an analysis of value of porcine halfcarcasses of varying leanness, calculated on the basis of a quotient of weights of individual cuts obtained from cutting

Table 2. Value of pork halfcarcass cuts obtained in different meatiness level groups of fatteners calculated by the same prices of cuts (PLN)
Tabela 2. Wartość elementów rozbiorowych półtuszy wieprzowej obliczona w grupach tuczników o różnej mięsności z uwzględnieniem jednolitych cen wyrębów (zł)

Meati-ness (%)	Tender-loin	Shoul-der with shank	Neck with bone	Ham with shank	Loin with bone	Belly with bone	Backfat	Other cuts	Value of halfcar-cass	Weight of whole halfcar-cass (kg)	Index value (PLN/ kg)
45	8.81	51.07	27.26	96.28	44.44	43.14	10.93	19.70	301.63	42.22	7.15
46	9.63	55.26	29.28	101.09	48.17	43.97	11.88	19.97	319.25	44.32	7.21
47	9.68	53.83	29.91	103.69	48.16	42.35	11.17	20.53	319.32	44.21	7.23
48	9.32	55.25	29.07	103.88	49.35	46.68	11.33	21.56	324.44	44.71	7.26
49	9.64	57.05	29.30	104.41	49.91	46.73	10.54	19.81	327.39	44.64	7.34
50	9.92	56.89	30.20	106.02	51.58	45.09	10.15	19.75	329.60	44.94	7.34
51	10.19	56.51	30.17	103.90	52.75	46.63	9.75	20.01	328.91	44.66	7.37
52	10.23	56.34	30.41	104.64	51.29	44.40	9.36	19.84	326.51	44.64	7.32
53	10.33	58.51	29.54	106.43	56.52	44.52	8.62	20.13	334.60	44.55	7.51
54	10.47	57.26	30.41	104.40	54.15	45.62	7.77	19.67	329.75	44.29	7.45
55	10.73	57.94	30.81	107.52	55.77	45.56	8.18	19.83	336.34	45.06	7.47
56	10.64	57.62	29.94	106.47	56.34	44.94	6.52	19.45	331.92	44.70	7.43
57	10.68	56.55	30.94	109.40	55,69	42.97	6.72	19.18	332.13	45.36	7.33
58	11.13	58.21	30.27	110.14	57.84	43.03	6.10	19.35	336.07	43.34	7.76
59	10.70	58.07	30.92	109.04	57.08	42.48	5.95	19.10	333.34	44.43	7.51
60	11.47	57.98	32.01	114.65	61.55	43.84	5.45	19.19	346.14	45.58	7.60
SEM	0.92	4.42	2.32	6.26	5.11	3.52	1.84	1.79	13.48	2.08	–
Test F	10.04[xx]	2.56[xx]	3.08[xx]	6.99[xx]	12.19[xx]	2.70[xx]	30.94[xx]	2.83[xx]	1.60[xx]	2.96[xx]	–

[xx] – significant at $P \leq 0.01$.

and the price expressed in the form of the total manufacturing cost (TMC), uniform for each cut, with no differentiation according to the EUROP grades. It results from these data that the total value of halfcarcasses of a comparable weight of approximately 44 kg increased from around 302 złotys to approximately 346 złotys with an increase in leanness from 45 to 60%. An increase in the value was statistically significant at the significance level $P \leq 0.01$. The index of halfcarcass value increased relatively slightly from 7.15 to 7.60 zł/kg. This results from the fact that the cutting of the halfcarcasses into primal parts and the sale of these cuts at identical prices, not differentiated in terms of leanness classes, yields a relatively low increase in its value, amounting to 14.6%. The index of increment in carcass value in this case was 2.82 grosz/%/kg.

Meat processing plants settling accounts for slaughter animals according to the EUROP classes use this classification for the diversification of purchase prices for cuts. Generally these prices are diversified for the primal cuts of the carcass, selling material of higher leanness at higher prices, e.g. according to the price list given in Table 7. Assuming these prices the values of halfcarcasses were calculated again at the cutting stage (Table 3). It turned out that the value of the carcass increased significantly ($P \leq 0.01$) from 283.14 złotys at leanness of 45% to 349.35 złotys at leanness of 60%, i.e. on average by 66.21 złotys, which amounted to 23.4%. The index of halfcarcass value also increased from 6.71 to 7.88 zł/kg, while the increment in carcass value was 7.32 gr/%/kg. The level of carcass leanness had a highly significant effect on the value of primal cuts from the carcass.

Table 3. Value of pork halfcarcass cuts obtained in different meatiness level groups of fatteners calculated by prices of cuts according to EUROP classes (PLN)
Tabela 3. Wartość elementów rozbiorowych półtuszy wieprzowej obliczona w grupach tuczników o różnej mięsności z uwzględnieniem cen wyrębów według klasyfikacji EUROP (zł)

Meatiness (%)	Tender-loin	Shoulder with shank	Neck with bone	Ham with shank	Loin with bone	Belly with bone	Other cuts	Value of halfcar-cass	Index value (PLN/kg)
1	2	3	4	5	6	7	8	9	10
45	6.72	46.04	24.26	91.47	40.14	43.88	30.63	283.14	6.71
46	7.43	49.82	26.05	96.04	43.50	44.72	31.04	298.60	6.74
47	7.62	48.53	26.62	98.52	43.49	43.07	29.07	296.92	6.72
48	7.61	49.81	25.87	98.69	44.57	47.47	30.89	304.91	6.82
49	7.90	51.43	26.08	99.20	45.07	47.52	32.35	309.55	6.93
50	8.21	52.11	27.43	100.73	47.40	45.86	29.53	311.27	6,93
51	9.02	53.99	28.83	98.71	50.57	46.41	29.70	317.23	7.10
52	9.04	53.83	29.06	99.42	49.17	45.16	29.20	314.88	7.05
53	9.31	55.90	28.23	101.12	54.19	45.28	28.75	322.78	7.25
54	9.52	54.71	29.06	99.19	51.91	46.40	27.44	318.23	7.19
55	9.99	56.23	29.88	103.96	54.21	46.34	28.01	328.62	7.29

Table 3 – cont.

1	2	3	4	5	6	7	8	9	10
56	9.87	57.62	29.94	106.47	56.34	45.71	25.97	331.92	7.43
57	10.03	56.55	30.94	109.40	55.69	43.71	25.90	332.49	7.33
58	10.64	58.21	30.27	110.14	57.84	43.77	25.55	336.42	7.76
59	10.21	58.06	30.92	109.04	57.08	43.21	25.05	333.57	7.51
60	11.05	58.03	32.38	115.90	63.36	44.59	24.04	349.35	7.67
SEM	1.05	4.17	2.20	5.78	4.25	3.81	3.63	11.94	–
Test F	10.5^{xx}	4.3^{xx}	3.5^{xx}	7.4^{xx}	12.5^{xx}	2.7^{xx}	5.2^{xx}	2.96^{xx}	–

^{xx} – significant at $P \leq 0.01$.

In many meat plants with slaughter and processing production most of the obtained halfcarcasses are trimmed to yield processing material. Calculation of carcass value based on tissue elements obtained from trimming provides a more detailed analysis of valuation for raw material of varying leanness. This analysis may be conducted with the division into more and less valuable parts of the halfcarcasses, i.e. the forequarter, the middles and the hindquarter.

The total value of trimming elements from the forequarter of the halfcarcass increased significantly from approximately 80 złotys to approximately 97 złotys with an increase in leanness from 45 to 60% (Table 4). The value index of the forequarter also increased systematically from 6.35 to 7.17 zł/kg with an increase in leanness. The increment in value of the forequarter in the analyzed range of leanness was 5.13 gr/%/kg.

Table 4. Value of pork halfcarcass cuts deboned from forequarter obtained in different meatiness level groups of fatteners (PLN)
Tabela 4. Wartość elementów z wykrawania przodu półtuszy wieprzowej obliczona w grupach tuczników o różnej mięsności (zł)

Meatiness (%)	Shoulder 4D	Shank muscle	Meat class IIB	Meat class IIIA	Meat class IV	Neck	Jowl	Fat	Skin and bone	Value of forequorter	Weight of forequorter (kg)	Index value (PLN/kg)
1	2	3	4	5	6	7	8	9	10	11	12	13
45	32.14	1.32	3.99	3.84	2.48	27.75	1.35	4.56	2.97	80.40	12.66	6.35
46	34.70	1.45	4.51	3.79	2.80	29.95	1.39	4.86	3.10	86.55	13.45	6.44
47	35.25	1.41	4.43	3.54	2.47	30.42	1.44	4.72	3.22	86.90	13.37	6.50
48	36.70	1.41	4.39	3.93	2.22	29.80	1.19	4.74	3.68	88.06	13.33	6.61
49	38.52	1.52	4.05	4.25	2.22	30.75	1.19	4.46	3.00	89.96	13.44	6.70
50	38.20	1.56	5.41	4.11	2.30	31.67	1.22	4.42	3.06	91.95	13.63	6.75

Table 4 – cont.

1	2	3	4	5	6	7	8	9	10	11	12	13
51	38.55	1.58	5.18	3.97	2.32	31.13	1.28	4.12	3.06	91.19	13.58	6.72
52	38.01	1.67	4.76	4.08	2.32	31.23	1.32	4.05	2.98	90.42	13.44	6.73
53	41.02	1.59	4.90	4.01	2.23	30.86	1.23	3.93	2.90	92.67	13.53	6.85
54	41.09	1.63	4.80	3.84	2.20	31.45	1.31	3.54	2.99	92.85	13.54	6.86
55	41.81	2.08	5.11	4.08	2.03	32.26	1.11	3.63	2.81	94.92	13.59	6.99
56	42.20	1.63	4.71	4.37	2.12	30.94	1.19	2.96	2.91	93.03	13.36	6.97
57	41.43	1.60	5.03	4.00	2.09	32.26	1.15	3.01	2.83	93.40	13.28	7.04
58	43.30	1.74	5.74	4.30	1.97	32.07	1.03	2.88	2.67	95.70	13.35	7.17
59	42.82	1.61	5.32	4.17	1.99	32.12	1.01	2.87	2.73	94.64	13.25	7.15
60	44.07	1.64	4.71	3.70	2.18	33.46	1.18	2.62	3.02	96.58	13.48	7.17
SEM	4.18	0.21	1.45	0.79	0.60	2.58	0.30	0.91	0.46	–	–	–
Test F	11.55[xx]	3.74[xx]	1.64[xx]	1.57[xx]	2.62[xx]	3.85[xx]	3.04[x]	12.05[xx]	3.44[xx]	6.56[xx]	1.01	–

[x] – significant at $P \leq 0.05$.
[xx] – significant at $P \leq 0.01$.

A higher value than that of the forequarter was found for the middles, since in half-carcasses with leanness of 45% it amounted to 113.81 złotys, while in halfcarcasses with leanness of 60% it was 131.90 złotys (Table 5). The value index of the middles increased in the investigated range of leanness from 8.24 to 9.42 zł/kg, while the index of value increment for the middles was higher than that for the forequarter and amounted to 7.38 gr/%/kg.

Table 5. Value of pork halfcarcass cuts deboned from middles obtained in different meatiness level groups of fatteners (PLN)
Tabela 5. Wartość elementów z wykrawania środka półtuszy wieprzowej obliczona w grupach tuczników o różnej mięsności (zł)

Meati-ness (%)	Loin	Belly without bone	Narrow ribs	Loin ribs	Meat II and IV classes	Backfat and small pices fat	Skin and bone	Value of the middles	Weight of the middles	Index value of the middles (PLN/kg)
1	2	3	4	5	6	7	8	9	10	11
45	38.97	47.81	6.33	1.69	7.42	10.21	1.44	113.81	13.82	8.24
46	42.05	48.31	6.40	1.80	8.33	11.11	1.52	119.52	14.56	8.21
47	41.84	46.46	6.81	1.69	8.53	10.28	1.56	117.17	14.17	8.27
48	45.31	51.45	6.66	1.81	8.27	10.33	1.58	125.41	14.76	8.50

Table 5 – cont.

1	2	3	4	5	6	7	8	9	10	11
49	45.34	51.29	6.83	1.72	7.90	9.56	1.41	124.05	14.44	8.59
50	46.69	49.37	6.72	1.83	7.99	9.16	1.42	123.18	14.32	8.60
51	48.76	49.95	7.12	1.79	7.69	8.83	1.48	125.52	14.42	8.71
52	47.03	48.46	6.52	1.77	7.71	8.46	1.40	121.35	13.95	8.70
53	50.80	48.69	7.34	1.68	7.77	7.97	1.41	125.66	14.12	8.90
54	49.19	49.80	7.30	1.73	7.61	7.11	1.44	124.18	14.00	8.87
55	53.82	49.82	7.37	1.55	7.40	7.57	1.41	128.94	14.29	9.02
56	55.11	48.91	6.70	1.66	7.65	5.86	1.56	127.45	13.92	9.16
57	54.12	47.07	7.14	1.64	7.74	6.06	1.46	125.23	13.61	9.20
58	57.64	46.49	7.39	1.64	7.72	5.58	1.55	128.01	13.67	9.36
59	56.76	46.37	7.30	1.63	7.51	5.52	1.53	126.63	13.60	9.31
60	61.47	47.58	7.13	1.52	7.64	4.94	1.62	131.90	14.00	9.42
SEM	5.21	4.25	0.81	0.31	1.28	1.83	0.30	–	–	–
Test F	26.68^{xx}	2.82^{xx}	3.24^{xx}	1.84^{x}	1.51	29.43^{xx}	3.55^{xx}	2.58^{xx}	2.87^{xx}	–

^{x} – significant at P ≤ 0.05.
^{xx} – significant at P ≤ 0.01.

The biggest effect of the level of leanness in fatteners was found in case of changes in the value of the hindquarter (Table 6). The total value of the hindquarter divided into trimming elements in halfcarcasses with leanness of 45% was 95.82 złotys, while in those with leanness of 60% it was 131.88 złotys. The value index for the hindquarter increased from 8.16 to 9.64 zł/kg. The increment in the value of the trimmed hindquarter was 9.25 gr/%/kg.

Table 6. Value of pork halfcarcass cuts deboned from hindquarter obtained in different meatiness level groups of fatteners (PLN)
Tabela 6. Wartość elementów z wykrawania zadu półtuszy wieprzowej obliczona w grupach tuczników o różnej mięsności (zł)

Meati-ness (%)	Quadri-ceps femoris	Semi-mem-brano-sus	Biceps femoris	Gluteus and lamba-rum muscles	Shank muscles	Meat I to IV classes	Fat	Skin and bone	Value of hind-quarter	Weight of lind-quarter (kg)	Index value of hind-quarter (PLN/ kg)
1	2	3	4	5	6	7	8	9	10	11	12
45	12.11	17.26	20.70	7.32	9.46	20.27	6.58	2.13	95.83	11.75	8.16
46	12.98	19.29	22.83	8.05	9.99	20.20	6.45	2.20	101.99	12.16	8.39
47	13.72	19.81	24.43	8.44	10.14	20.08	6.40	2.51	105.53	12.60	8.38

Table 6 – cont.

1	2	3	4	5	6	7	8	9	10	11	12
48	13.92	20.25	24.22	8.94	10.45	20.69	6.10	2.51	107.08	12.61	8.50
49	14.28	21.28	25.34	9.38	10.61	20.59	5.65	2.34	109.47	12.57	8.71
50	14.58	21.86	25.54	9.46	10.96	21.22	5.62	2.47	111.71	12.82	8.72
51	14.74	21.83	25.72	9.65	10.91	20.26	5.39	2.39	110.89	12.56	8.83
52	14.58	21.96	25.66	9.35	10.28	20.82	5.39	2.47	111.51	12.71	8.78
53	15.13	22.88	26.64	10.22	11.40	21.44	5.16	2.43	115.30	12.91	8.94
54	15.34	22.49	27.00	9.80	11.51	20.98	4.52	2.33	113.97	12.53	9.10
55	15.93	23.79	28.38	10.51	11.66	21.64	4.76	2.23	118.93	12.95	9.19
56	15.69	24.06	28.33	10.40	11.84	21.94	4.16	2.42	118.84	12.76	9.32
57	15.90	25.09	29.18	10.61	12.06	23.02	4.11	2.34	122.31	12.99	9.42
58	16.92	25.26	30.93	11.43	12.35	23.06	3.71	2.56	126.76	13.05	9.72
59	16.67	25.72	29.95	11.29	12.14	23.93	3.72	2.47	125.89	12.97	9.71
60	17.82	27.62	32.18	11.69	12.59	23.93	3.47	2.58	131.88	13.68	9.64
SEM	1.58	2.41	2.83	1.24	1.35	4.49	1.28	0.35	–	0.54	–
Test F	15.61[xx]	22.26[xx]	20.20[xx]	17.29[xx]	7.80[xx]	9.78[xx]	26.27[xx]	4.18[xx]	20.16[xx]	5.15[xx]	–

[xx] – significant at $P \leq 0.01$.

Table 7. Prices of elements obtained from cutting and deboning of pork halfcarcasses used for calculation of their value (PLN/kg)
Tabela 7. Ceny elementów z rozbioru i wykrawania półtusz wieprzowych przyjęte do obliczeń ich wartości (zł/kg)

Cutting				Deboning	
element	price			element	price
1	2			3	4
Head	1.65			Clean tenderloin	20.25
Ear	5.67			Meat class I	10.51
Tenderloin	15.51			Meat class IIA	8.88
Tenderloin acc. to EUROP classes	S 15.85	E 15.51	U 14.61 / R 13.38	Meat class IIB	6.61
Tail	1.09			Meat class IIIA	8.93
Front foot	2.13			Meat class IIIB	8.51
Hind foot	1.44			Meat class IV	3.55
Shoulder with shank	7.62			Meat from shoulder 4D	10.52

Table 7 – cont.

1	2				3	4
Shoulder acc. to EUROP classes	S 7.63	E 7.62	U 7.28	R 6.87	Front shank muscles	10.04
Neck with bone	9.45				Neck without bone	12.66
Jowl	5.34				Loin without bone	17.99
Leg with shank	9.02				Belly without bone	10.64
Leg acc. to EUROP classes	S 9.16	E 9.02	U 8.57	R 8.57	Leg muscles SOG	14.47
Loin with bone	12.08				Hind shank muscles	10.51
Loin acc. to EUROP classes	S 12.58	E 12.08	U 11.58	R 10.91	Fat from ventral part of belly	1.97
Narrow ribs	8.09				Small change fat	3.13
Loin ribs	5.03				Skin	2.18
Back fat	4.08				Bone	0.05
Ventral part of belly	1.97					
Belly with bone	8.78					
Belly acc. to EUROP classes	S 8.83	E 8.78	U 8.36	R 7.83		

S, E, U, R – carcass classes in EUROP system.

After results of calculations were combined for the values of the forequarter, the middles and the hindquarter, the value of halfcarcasses without heads and legs was obtained as the total of the values of all elements from trimming (Table 8). The total value of halfcarcasses with mean weight of approximately 40 kg in pigs with leanness of 45% was 290.03 złotys and in fatteners with a 60% leanness it was 360.36 złotys. This results from the fact that the change in the value of the whole halfcarcass in the analysed leanness range was 24.3%, while the value index increased from 7.59 zł/kg in carcasses with leanness of 45% to 8.76 zł/kg in carcasses with meat content of 60%. The index of value increment for trimmed halfcarcasses was 7.32 gr/%/kg.

Table 8. Value of pork halfcarcasses submitted of deboning process according to meatiness level
Tabela 8. Wartość półtusz wieprzowych poddanych wykrawaniu w zależności od poziomu mięsności

Meatiness (%)	Value of deboned halfcarcass (PLN)	Total weight of forequarter, middles and leg (kg)	Index value of halfcarcass (PLN/kg)
45	290.03	38.23	7.59
46	308.06	40.09	7.68
47	309.60	40.14	7.71
48	320.55	40.70	7.88
49	323.48	40.45	8.00
50	326.84	40.77	8.02
51	327.70	40.56	8.08
52	323.18	40.10	8.06
53	333.63	40.56	8.22
54	331.00	40.07	8.26
55	342.79	40.83	8.40
56	339.32	40.04	8.47
57	340.94	39.88	8.55
58	350.47	40.07	8.75
59	347.16	39.82	8.72
60	360.36	41.16	8.76

Discussion

Results clearly indicate a highly significant effect of the level of leanness of fatteners on the commercial value of carcasses. If halfcarcasses were trimmed and the total value of all obtained elements was calculated, then it turns out that this value in fatteners with meat content of 60% was higher than that of fatteners with leanness of 45% by 24.3%, while the value index, describing the value of 1 kg halfcarcass increased from 7.59 to 8.76 złotys. The increment of carcass value in the analysed range of leanness was 7.32 gr/%/kg. In case of cutting of halfcarcasses the analogous increment index turned out to be much lower and amounted to 2.82 gr/%/kg. In order to increase the value of this index it is necessary to differentiate the purchase prices of cuts depending on the class of leanness. After the values of cuts obtained from halfcarcass cutting were calculated taking into consideration different prices for individual carcass classes the index of value increment was identical as that for trimming, i.e. 7.32 gr/%/kg.

In their study conducted in 1997 STRZELECKI et AL. (1997) recorded slightly lower values of indexes of carcass value increment, i.e. 2 gr/%/kg in case of cutting and

5 gr/%/kg in case of trimming. This is connected both with a change in prices in the compared period and with an improvement in the slaughter value of fatteners. The considerable effect of variation in prices for elements from halfcarcass cutting and trimming was pointed to by NOWACHOWICZ et AL. (2008), who stated that in 2006 the commercial value of porcine halfcarcasses dropped considerably in comparison to the year 2004 (e.g. halfcarcasses of class E by 16.3%), while in 2009 in comparison to 2006 (NOWACHOWICZ 2009) it increased considerably (by 41% in halfcarcasses class E).

The effect of leanness of porcine carcasses on their commercial value is commonly known and leads to a conclusion that the higher the proportion of meat in the carcass, the higher its value (BORZUTA and POSPIECH 1991, GAJEWCZYK et AL. 2008, KARAMUCKI et AL. 2004, STRZELECKI et AL. 1997).

Of all tissues contained in cuts the meat tissue is the most expensive component. In the presented study the sale price expressed as the total manufacturing cost, i.e. TMC, was e.g. for ham muscles at 14.47 zł/kg, backfat at 4.08 zł/kg, skin at 2.18 zł/kg and bones at 0.05 zł/kg. Proportions of these tissues in the carcass determine its value. When the proportion of the muscle tissue increases, the commercial value of halfcarcasses increases as well, which is confirmed by the results of this study.

Proportions of tissues also have a considerable effect on the variation in the commercial value of individual parts of the carcass. Mean value index for the forequarter, the middles and the hindquarter, calculated on the basis of trimming, was 6.82, 8.82 and 8.97 zł/kg, respectively. The index of value increment for halfcarcass sections in the analyzed leanness range from 45 to 60% for the forequarter was 5.13 zł/%/kg, for the middles it was 7.38 zł/%/kg and for the hindquarter it amounted to 9.25 zł/%/kg, respectively. Analysis of these data leads to conclusion that the value of the hindquarter is to the highest degree responsible for an increase in the value of fatteners with an increase in their leanness. Thus, when selecting appropriate breeds and crosses for fattening it is necessary to consider a high share of the hindquarter in the body constitution and only then the proportion of the middles. The differing role of individual sections of the body in the modification of carcass value was previously mentioned by other researchers (BORZUTA 1998, KARAMUCKI et AL. 2004, STRZELECKI et AL. 1997). It was stressed in those studies that the commercial value is determined to the highest degree by yield, as well as quality of ham and loin.

Conclusions

1. Meat content in the porcine carcass has a highly significant effect on the commercial value of fatteners, calculated on the basis of the total manufacturing cost of the elements obtained from carcass cutting and trimming.

2. The index of carcass value increment, defining the increase in the value of 1 kg carcass at an increase in leanness by 1%, within the analyzed range of meat content of fatteners from 45 to 60% was 2.82 grosz for cutting and 7.32 grosz in case of trimming into processing elements.

3. In order to enhance the effect of fattener leanness on the variation in the value of carcasses subjected to cutting the purchase prices of commercial cuts need to be determined for individual carcass classes. At such a method of settlement of cutting the index

of carcass value increment increased in value from 2.82 to 7.32 gr/%/kg, i.e. it reaches an identical level as when settling carcass trimming.

4. The anatomical section of the body has a significant effect on the increment in value calculated on the basis of the analysis of trimming for halfcarcasses differing in meatiness. The lowest index of value increment was found for the forequarter (5.13 gr/%/kg), a higher value for the middles (7.38 gr/%/kg) and the highest for the hindquarter (9.25 gr/%/kg). Thus when selecting breeds and crosses for fattening we need to focus on the high share of the hindquarter in the body structure.

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WPŁYW POZIOMU MIĘSNOŚCI TUCZNIKÓW NA WARTOŚĆ HANDLOWĄ TUSZ WIEPRZOWYCH

Streszczenie. Celem pracy było badanie wpływu mięsności tuczników na ich wartość handlową obliczoną na podstawie całkowitego kosztu wytworzenia elementów z rozbioru i wykrawania półtusz w dużym zakładzie mięsnym. Badania wykonano w 2009 roku na 327 tuszach wieprzowych, podzielonych na 16 grup o mięsności od 45 do 60%, różniących się 1-procentowym przedziałem zawartości mięsa. Stwierdzono, że wskaźnik przyrostu wartości, określający wzrost wartości 1 kg tuszy przy zwiększeniu mięsności o 1%, wynosi 2,82 gr w przypadku rozbioru i 7,32 gr w przypadku wykrawania na elementy. W celu zwiększenia wartości tego wskaźnika w przypadku rozbioru do poziomu porównywalnego z wykrawaniem należy różnicować ceny zbytu wyrębów według klas EUROP. Stwierdzone różne wskaźniki przyrostu wartości poszczególnych części półtuszy potwierdzają, że w doborze genotypu do tuczu należy zwracać szczególną uwagę na duży udział zadu (wielkość wskaźników odpowiednio 5,13, 7,38 i 9,25 gr/%/kg dla przodu, środka i zadu).

Słowa kluczowe: tusze wieprzowe, mięsność, wartość handlowa

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