ISSN 1644-0714
ISSN 2300-6145 (online)
DOI:10.21005/asp.2016.15.4.04
www.asp.zut.edu.pl

ACTA SCIENTIARUM POLONORUM *Acta Sci. Pol. Zootechnica 15(4) 2016, 41–54*

EFFECT OF AGE AND SEX OF SLAUGHTERED CATTLE ON DRESSING PERCENTAGE AND EUROP CLASSIFICATION RESULTS

Marek Janiak, Anna Sawa, Mariusz Bogucki✉

Department of Cattle Breeding, UTP University of Science and Technology, Mazowiecka 28, 85-084 Bydgoszcz, Poland

Abstract. The effect of bovine carcass category on dressing percentage and EUROP classification results was determined on 2627 head of slaughtered cattle, using the FREQ and GLM procedures of SAS. The largest categories of slaughter cattle were bulls (30%) as well as young bulls and cows (each around 28%). The most numerous carcass conformation class in all the categories was class O (71.91%), followed by R (15.07%), P (11.88%) and U (1.14%). Moderate fatness of bull carcasses was observed for both A and B age categories. Young bull carcasses generally contained less fat than heifer carcasses. Dressing percentage coefficients were similar for young bulls (category A) and heifers (category E) ($P \leq 0.01$), as a result of which no statistically significant effect of sex on dressing percentage was found for young slaughter cattle. The age factor caused much greater differences ($P \leq 0.01$) in dressing percentage values for the slaughtered females (categories D and E) than for the slaughtered males (categories A and B).

Key words: slaughter cattle, dressing percentage, EUROP classification

INTRODUCTION

Due to the wide variety of slaughter cattle breeds in Poland, the animals slaughtered at abattoirs represent different ages and live weights [Janiszewski 2015]. This results from differences in tissue accretion of growing and developing animals, which has a direct influence on the quality of the carcasses obtained. EUROP classification of bovine carcasses accounts for their muscling and fatness traits.

✉bogucki@utp.edu.pl

The high variation in muscling and fatness requires the carcasses of slaughter cattle to be divided into commercial groups known as categories, classes and subclasses [Commission Regulation (EC) No 1249/2008].

Dressing percentage is one of the basic parameters used to evaluate the quality of slaughter animals. It is estimated as the ratio of hot carcass weight to live weight at slaughter. In cattle, dressing percentage depends among others on the breed, sex, body conformation, system of feeding, and preslaughter handling conditions [Daszkiewicz and Wajda 2002, Oler et al. 2004, Miciński et al. 2005, Schöne et al. 2006, Wiegand et al. 2006, Gigli et al. 2007, Wajda et al. 2011, Litwińczuk et al. 2012, Nogalski et al. 2013].

The aim of the study was to analyse the effect of age and sex of slaughtered cattle (category) on dressing percentage and EUROP classification results.

MATERIAL AND METHODS

The experiment was conducted with 2627 head of slaughter cattle. Data on the age and sex of purchased cattle (category), dressing percentage, and EUROP classification results for conformation and fat cover, were obtained from a meat plant located in eastern Poland. The year 2015 was analysed. In accordance with Commission Regulation (EC) No 1249/2008 of 10 December 2008, the following categories were used: A – young bulls, carcasses of uncastrated male animals aged less than 24 months; B – bulls, carcasses of other uncastrated male animals, C – bullocks, carcasses of castrated male animals, D – carcasses of cows; and E – carcasses of heifers. As regards the development of carcass profiles, the following conformation classes were used: S – superior (carcasses obtained from cattle of the double-muscled type), E – excellent, U – very good, R – good, O – fair, P – poor. The carcasses were also graded according to the class of fat cover: 1 – low, 2 – slight, 3 – average, 4 – high, 5 – very high. Each conformation and fat cover class was divided into three subclasses, designated as "+", "no symbol", and "–".

For the statistical analysis, a chi-square test [SAS 2014] was used to estimate the effect of age and sex of slaughtered cattle (beef carcass category) on the proportion of different conformation (muscle development) and fat cover classes and subclasses according to the EUROP system. Dressing percentage was analysed as the effect of EUROP conformation (muscle development) or fat cover category and class and the interaction between them, using the following linear model (GLM procedure) [SAS 2014]:

$$y_{pk} = \mu + p_p + k_k + p_p \times k_k + e_{pk}$$

where:

μ – mean,
p_p – effect of muscle development (p = U, R, O, P) or fat cover class (p = 1, 2, 3, 4),
k_k – effect of category of bovine carcass (k = A, B, D, E),
$p_p \times k_k$ – effect of interaction between conformation (fat cover) class × bovine carcass category,
e_{pk} – random error of observation.

An F test was used to determine the significance of the effect of a factor on dressing percentage. Scheffe's test was performed to determine significant differences between mean dressing percentages within classification factors.

RESULTS AND DISCUSSION

The most represented categories of slaughter cattle, purchased by the abattoir, were young bulls, bulls and cows, which accounted for over 86% (Table 1). This is consistent with the findings of Janiszewski et al. [2015], who characterized the purchase structure of slaughter cattle in Poland and attributed the low (15%) and continually decreasing proportion of purchased heifers to the export of live calves. According to the data of the Ministry of Agriculture and Rural Development, the structure of the commercial slaughter of cattle in Poland shows the increasing proportion of young bulls and the decreasing proportion of cows in the purchase structure [Beef and Veal Market 2014].

In abattoirs that pay livestock producers on the post-slaughter classification, carcass conformation and fat cover are evaluated separately. Conformation classes are more important because the evaluation is made based on development of shoulder, back and round muscles, which are the carcass parts characterized by the highest culinary usefulness and commercial value. The results showed that the largest carcass conformation class in all categories was class O (71.91%), which ranged from 82.42% in bulls (category B) to 60.99% in cows (category D). The least numerous class was U; its proportion was 0 in cows (category D), 1.21% in bulls (category B) and 3.74% in heifers (category E). The poorest conformation class (P) was rare among the carcasses of young bulls, bulls and heifers (each less than 3% in categories A, B and E, respectively), but in the case of cow carcasses (category D) it was as high as 35.25%. Class R was represented by 30.75% carcasses of category E, 20.43% carcasses of category B, and 13.42% carcasses of category A. Only 3.75% of the cows were graded as class R. The R conformation class was the second largest class (around 15.07%) after Janiszewski et al. [2015] presented a similar proportion of conformation classes within different categories to ours. They found conformation class O to predominate and its average

Table 1. Relationship between age and sex of cattle (category) on carcass conformation results (proportion of different classes)

Tabela 1. Zależność między wiekiem i płcią bydła (kategorią), a wynikami umięśnienia tusz (udziałem poszczególnych podklas)

Category – Kategoria	Number, % Liczba, %	Proportion of conformation classes, % Udział klas umięśnienia, % $\chi^2 = 633.7^{xx}$			
		U	R	O	P
A – carcasses of uncastrated males aged less than 24 months A – tusze niekastrowanych młodych samców w wieku do 2 lat	745/28.36	1.21	13.42	82.42	2.95
B – carcasses of other uncastrated male animals B – tusze pozostałych niekastrowanych samców	788/30.00	1.02	20.43	76.27	2.58
D – carcasses of female animals that have calved D – tusze samic, które się cieliły	746/28.40	0.00	3.75	60.99	35.25
E – carcasses of other female animals E – tusze pozostałych samic	348/13.25	3.74	30.75	62.93	2.59
Total – Razem	2627/100.00	1.14	15.07	71.91	11.88

[xx] significance at $P \leq 0.01$ – istotność przy $P \leq 0{,}01$.

proportion was 52–58% depending on cattle category. Class R, the second largest among those purchased, was represented mostly by heifers (44%) and cows (18%). Carcass classes E and P were only represented by a fraction of percent except for the cows, the proportion of which in conformation class P was as high as 23%. Wajda and Borzuta [2011] noted the following proportion of conformation classes for young bulls: 0.2% class E, 3.2% class U, 28% class R, 60.3% class O, and 8.3% class P. In western European countries the purchase structure of cattle is much more favourable, which is due to the high proportion of meat-producing breeds. For example, in Italy 17.7% of young bull carcasses are graded conformation class E, with 48.5% class U and only 4% class O carcasses [Beef and Veal Market 2014].

Table 2 shows the results for bovine carcass muscle content depending on age and sex (category). In accordance with applicable regulations, this classification also accounts for three subclasses for each conformation class ("+", "no symbol", "–"). In terms of conformation, most of young bull carcasses of category A were classified as conformation subclass O (48.05%), followed by subclass O+ (33.41%) and O– (33.41%). Only a small percentage of young bull carcasses of category A were graded as subclass U+ (0.94%) and U (0.27%). Carcasses from bulls of age category B most often represented conformation subclasses O+ (39.44%) and O (30.03%). Much fewer of these carcasses were classified as subclass O– (17.39%), and only 0.51% each as subclass U+ and U. There were no young bull carcasses of category A and bull carcasses of category B in the conformation subclasses P and P–, whereas the proportion of these carcasses in subclass

P+ was 2.95% and 2.22%, respectively. Carcasses from cows were most often classified as conformation subclass O (30.03%) and O– (26.41%). In addition, as much as 21.18% of the cow carcasses were graded subclass P+. Most heifer carcasses were included in conformation subclass O (31.61%). Much lower, but still considerable proportions of heifer carcasses were graded as subclass O+ (19.26%), R– (15.52%) and R (13.22%).

Table 2. Relationship between age and sex of cattle (category) on carcass conformation results (proportion of different subclasses)

Tabela 2. Zależność między wiekiem i płcią bydła (kategorią), a wynikami umięśnienia tusz (udziałem poszczególnych podklas)

Category – Kategoria		Proportion of conformation subclasses, % Udział podklas umięśnienia, % $\chi^2 = 887.6^{xx}$										
		U	U+	R–	R	R+	O–	O	O+	P–	P	P+
A		0.27	0.94	5.50	6.17	1.74	15.03	48.05	33.41	0.00	0.00	2.95
B		0.51	0.51	5.46	11.55	3.43	17.39	37.31	39.44	0.00	0.00	2.22
D		0.00	0.00	2.28	1.47	0.00	26.41	30.03	7.89	5.36	8.71	21.18
E		1.72	2.01	15.52	13.22	2.01	7.47	31.61	19.26	0.00	0.00	2.59
Total – Razem	N	12	18	155	194	47	472	986	431	40	65	207
	%	0.46	0.69	5.90	7.38	1.79	17.97	37.53	16.41	1.52	2.47	7.88

[xx] significance at $P \leq 0.01$ – istotność przy $P \leq 0{,}01$.

Very good conformation was characteristic of a very small proportion of analysed slaughter cattle, with 0.69% of the carcasses classified as subclass U+ and 0.46% as subclass U. The largest category, in both the U+ and U subclass, were carcasses of heifers (2.01% and 1.72%, respectively). Subclasses R+, R and R– were represented by 1.79%, 7.38% and 5.9% carcasses, respectively. Most carcasses in subclass R+ were noted for bulls of age category B (3.43%), and for cows in subclasses R and R–. The largest number of bovine carcasses had fair conformation, with 37.53%, 17.97% and 16.41% carcasses graded as subclass O, O– and O+, respectively. The highest proportion in subclass O was noted for bulls of category A (48.05%). Subclass O– was most commonly represented by the carcasses of cows (26.41%), and subclass O+ by the bulls of category B (39.44%). The carcasses of cows were the only slaughter cattle category to be classified as subclasses P and P– (5.36% and 8.71%, respectively) as well as the largest in P+ (21.18%). Our results are similar to the findings of Wajda et al. [2011], who reported poor carcass conformation of Polish Holstein-Friesian, despite the fact that they were fed intensively and had daily weight gains of 1 kg. These authors classified most of the young bull carcasses as EUROP class O (77.25%) followed by class R (22.75%). In a follow-up study with Polish Holstein-Friesian cattle, Wajda et al. [2014] found that their carcasses were characterized by average developed

muscles of the shoulder, back and round, and mostly qualified as conformation class O (52.44%), followed by class O+ (17.48%), R– (13.29%), R (11.89%), and O– (4.9%). Schöne et al. [2006] also observed that the most carcasses from young HF bulls represented conformation class O. Similar conformation results for carcasses of PHF cattle were obtained by Nogalski et al. [2013]. The Department of Agricultural Markets of the Ministry of Agriculture and Rural Development [Beef and Veal Market 2014] reports that carcasses from purchased cows were classified in terms of conformation as class O (52.2%), class P (37.4%), and also class R (8.4%). In our study, we obtained a similar percentage of cow carcasses in EUROP conformation classes O, R and P.

Table 3 shows the distribution of different bovine carcass fat classes within categories. Carcasses from young bulls of age category A and of older bulls of category B, were mostly qualified as fatness class 2 (49.4% and 49.75%, respectively), followed by fatness class 3 (47.11% and 45.59%, respectively). The lowest proportion of animals in category A and B was noted in fatness class 4 (1.34% and 1.78%, respectively). There were differences in the percentage of cow carcasses in fatness class 1 (32.04%), 2 (29.62%), 3 (32.17%) and 4 (6.17%). Most of heifer carcasses were graded as fatness class 3 (64.37%) and a small proportion as class 1 (0.86%).

Table 3. Relationship between age and sex of cattle (category) on carcass fatness results (proportion of different classes)

Tabela 3. Zależność między wiekiem i płcią bydła (kategorią), a wynikami otłuszczenia tusz (udziałem poszczególnych klas)

Category – Kategoria	Number, % Liczba, %	Proportion of fatness classes, % Udział klas otłuszczenia, % $\chi^2 = 657.2^{xx}$			
		1	2	3	4
A – carcasses of uncastrated males aged less than 24 months A – tusze niekastrowanych młodych samców w wieku do 2 lat	745/28.36	2.15	49.40	47.11	1.34
B – carcasses of other uncastrated male animals B – tusze pozostałych niekastrowanych samców	788/30.00	2.54	49.75	45.94	1.78
D – carcasses of female animals that have calved D – tusze samic, które się cieliły	746/28.40	32.04	29.62	32.17	6.17
E – carcasses of other female animals E – tusze pozostałych samic	348/13.25	0.86	19.83	64.37	14.94
Total – Razem	2627/100.00	10.58	39.97	44.80	4.64

[xx] significance at $P \leq 0.01$ – istotność przy $P \leq 0,01$.

Low fatness, namely no fat cover or a thin layer of external fat was characteristic of 10.58% bovine carcasses under analysis. Class 1 was mostly represented by cow carcasses. The largest class 3 (44.8%) was represented by carcasses with average fatness, in which fat cover is visible everywhere except for the round and shoulder. Class 3 was dominated by the heifer category (64.37%). The lo-

west number of carcasses among the studied slaughter cattle was graded as class 4 (4.64%), including 14.94% of the cow carcasses. Research results point to the moderate fatness of bull carcasses for both age category A and B, which is confirmed by the findings of Wajda et al. [2011] and Oler et al. [2004]. Carcasses from young bulls are generally less fatty compared to heifer carcasses, which was also reported by Gil et al. [2007]. According to Śmiecińska and Wajda [2008], the most common fatness classes found in purchased cow carcasses are class 3 followed by class 2 and 4. The same author found the increase in carcass fatness class is paralleled by increases in their weight (by about 10 kg) and in meat fat percentage.

The effect of cattle age and sex (category) on fatness results of bovine carcasses, which account for the proportion of different subclasses, was confirmed statistically ($P \leq 0.01$) (Table 4). Very low fatness was characteristic of 9.67% carcasses, most of which were from cows (31.9%). Subclass 1+ included 0.91% carcasses with a very small proportion of cows (0.13%). Subclass 2+ included 30.26% carcasses (the largest fatness subclass). Both subclass 3+ and 3 was dominated by heifer carcasses (30.17% and 25.19%, respectively). Fatness subclass

Table 4. Relationship between age and sex of cattle (category) on carcass fatness results (proportion of different subclasses)

Tabela 4. Zależność między wiekiem i płcią bydła (kategorią), a wynikami otłuszczenia tusz (udziałem poszczególnych podklas)

Category – Kategoria		Proportion of fatness subclasses, % Udział podklas otłuszczenia, % $\chi^2 = 903.6^{xx}$										
		1	1+	2–	2	2+	3–	3	3+	4–	4	4+
A		0.67	1.48	2.55	7.11	39.73	16.51	20.94	9.66	0.40	0.81	0.13
B		1.14	1.40	2.79	7.74	39.21	15.99	17.01	12.94	0.63	1.14	0.00
D		31.90	0.13	3.08	8.98	17.56	4.16	13.40	14.61	0.94	4.96	0.27
E		0.57	0.29	0.57	2.30	16.95	8.91	25.29	30.17	2.30	11.21	1.44
Total – Razem	N	254	24	66	189	795	311	478	388	23	91	8
	%	9.67	0.91	2.51	7.19	30.26	11.84	18.20	14.77	0.88	3.46	0.30

^{xx} – significance at $P \leq 0.01$– istotność przy $P \leq 0{,}01$.

3+ was the second largest group of carcasses (14.77%) after 2+. High fatness was characteristic of a small proportion of analysed bovine carcasses, with subclasses 4+, 4 and 4– being represented by 0.3%, 3.46% and 0.88% carcasses. Detailed analysis of fatness classes and subclasses for carcasses of young bulls of age category A and B allows a conclusion that most carcasses were classified as subclass 2+, followed by subclass 3–. These results are consistent with the findings of Oler et al. [2004] and Wajda et al. [2011].

Table 5 shows the results for the effect of cattle category on dressing percentage. The highest dressing percentage (53.97%) was obtained by bulls (category B). Their advantage over young bulls (category A) amounted to 0.57% and was significant ($P \leq 0.01$). Slightly lower (53.06%) dressing percentage was observed in heifers (category E). Dressing percentage of cows was lower ($P \leq 0.01$) by about 6%. It was also found that the age factor caused much greater differences in dressing percentage values for the slaughtered females (categories D and E) than for the slaughtered males (categories A and B). The coefficients of dressing percentage calculated for bulls were lower than or similar to those reported by other authors [Wajda et al. 2011 (about 56%), Adamczak et al. 2012 (53.18%), Litwińczuk et al. 2012 (52.86–58.84% depending on breed), Nogalski et al. 2013 (54.58–56.88% depending on conformation, Wajda et al. 2014 (54–57% depending on conformation class)]. Młynek and Litwińczuk [2003] and Gil et al. [2007] found the coefficient of dressing percentage to be much higher in young bulls than in heifers.

Table 5. Relationship between age and sex of cattle (category) on dressing percentage

Tabela 5. Zależność między wiekiem i płcią bydła (kategorią), a wydajnością rzeźną, %

Category – Kategoria	Dressing percentage, % Wydajność rzeźna, %	
	LSM	SE
A – carcasses of uncastrated males aged less than 24 months A – tusze niekastrowanych młodych samców w wieku do 2 lat	53.40 AB	11.04
B – carcasses of other uncastrated male animals B – tusze pozostałych niekastrowanych samców	53.97 ACD	10.73
D – carcasses of female animals that have calved D – tusze samic, które się cieliły	46.00 BCE	11.03
E – carcasses of other female animals E – tusze pozostałych samic	53.06 DE	16.15

A, B, C, D, E – Means within columns followed by the same letters differ significantly at $P \leq 0.01$.
A, B, C, D, E – Średnie w kolumnach oznaczone tymi samymi literami różnią się istotnie przy $P \leq 0{,}01$.

When analysing the effect of conformation class and category on dressing percentage, it was found that in conformation classes U, R and O, the highest dressing percentage was achieved by cattle graded as category B, and in conformation class P by cattle classified as category A (Table 6). For each conformation class, the advantage of young bulls and bulls (category A and B) over cows and heifers (category D and E) in dressing percentage was also noted. When taking into account the effect of age within bovine sex on dressing percentage, an observation was made that in the case of bulls (category B) whose carcasses were graded as conformation class U, R and O, it was slightly higher (by 1.98%, 0.82% and 0.29%, respectively) compared to that obtained by young bulls (category A) (Table 1). A reverse situation occurred for the worst conformation class (P). It

was also established that depending on conformation class, the predominance of heifers over cows in dressing percentage was 3.71–6.34%.

Table 6. Effect of conformation class and beef carcass category on dressing percentage

Tabela 6. Wpływ klasy umięśnienia i kategorii tuszy wołowej na wydajność rzeźną, %

Conformation class Klasa umięśnienia	Dressing percentage of beef carcass in category Wydajność rzeźna tuszy wołowej w kategorii, %			
	A	B	D	E
U	57.53	59.51	–	56.43
R	55.38 A	56.20	51.07 A	54.78
O	53.09 A	53.38 B	47.22 AB	52.17
P	51.31 A	50.90	43.22 A	49.56

A, B – Means within lines followed by the same letters differ significantly at $P \leq 0.01$.
A, B – Średnie w wierszach oznaczone tymi samymi literami różnią się istotnie przy $P \leq 0{,}01$.

In each carcass category, dressing percentage tended to decrease with deteriorating conformation, with differences of 6.22% and 8.61% in categories A and B, and 7.85% and 6.87% in categories D and E. Therefore, considering the age of slaughtered cattle, greater differences concerned older animals. These results confirm the trends described by other authors. According to Wajda et al. [2011], the average dressing percentage of young bulls whose carcasses were graded as conformation class R, was 1.56% higher ($P \leq 0.01$) than that found in the group

Table 7. Effect of fatness class and beef carcass category on dressing percentage

Tabela 7. Wpływ klasy otłuszczenia i kategorii tuszy wołowej na wydajność rzeźną, %

Fatness class Klasa otłuszczenia	Dressing percentage of beef carcass in category Wydajność rzeźna tuszy wołowej w kategorii, %			
	A	B	D	E
1	51.14 A	50.85 B	43.08 AB	52.24
2	52.29	53.56 A	45.34 Aa	50.51 a
3	53.71 B	54.00 A	47.77 ABC	53.21
4	55.66 A	56.44 B	50.29 ABC	54.60

A, B, C – Means within lines followed by the same capital letters differ significantly at $P \leq 0.01$.
A, B, C – Średnie w wierszach oznaczone tymi samymi dużymi literami różnią się istotnie przy $P \leq 0{,}01$.
a – Means within lines followed by the same small letter differ significantly at $P \leq 0.05$.
a – Średnie w wierszach oznaczone tą samą małą literą różnią się istotnie przy $P \leq 0{,}05$.

of young bulls whose carcasses were graded as O. In a subsequent study, Wajda et al. [2014] concluded that the average dressing percentage of young bulls was dependent on carcass conformation class. The highest dressing percentage was characteristic of the young bulls whose carcasses were graded as conformation class R (57.27%), and the lowest of young bulls whose carcasses were classified as O (54.13%). Likewise, Adamczak et al. [2012] found that the highest average

dressing percentage was obtained by bulls of class U, lower by bulls of class R, and lowest by those of class O.

Analysis of the results in Table 7 indicates that in each category, dressing percentage values increased with increasing carcass fatness. Considering the first two categories, greater differences were established for older bulls (category B) (5.59%) than for young bulls (category A) (4.52%). When taking all the categories into account, the largest differences were observed in category D (7.21%) and the smallest in category E (2.36%). When evaluating the effect of fatness on dressing percentage of cattle representing the different categories, the highest dressing percentage (52.24%) was found for heifers (category E) in fatness class 1, and for bulls (category B) in the other fatness classes (53.56–56.44%). Regardless of fatness class, the lowest dressing percentage was achieved by cows, with the difference in relation to the highest dressing percentage category decreasing from 9.16% (fatness class 1) to 6.15% (fatness class 4).

CONCLUSIONS

In conclusion, the analysis of the effect of age and sex of slaughtered cattle (category) on EUROP classification results demonstrated that the largest categories of slaughter cattle were B (30%) as well as A and D (each around 28%). The most numerous carcass conformation class in all the categories was class O (71.91%), followed by R (15.07%), P (11.88%) and U (1.14%). Moderate fatness of bull carcasses was observed for both A and B age categories. Young bull carcasses generally contained less fat than heifer carcasses. Dressing percentage coefficients were similar for young bulls (category A) and heifers (category E), as a result of which no statistically significant effect of sex on dressing percentage was found for young slaughter cattle. The age factor caused much greater differences ($P \leq 0.01$) in dressing percentage values for the slaughtered females (categories D and E) than for the slaughtered males (categories A and B).

REFERENCES

Adamczak, L., Florkowski, T., Niewęgłowski, T. (2012). Uzysk elementów zasadniczych i kulinarnych w tuszach buhajków w zależności od ich masy i klasy uformowania [Yield of primal and culinary cuts from young bulls' carcasses depending on their weight and conformation score]. Zesz. Probl. Post. Nauk Rol., 571, 7–16 [in Polish].

Commission Regulation (EC) No. 1249/2008 laying down detailed rules on the implementation of the Community scales for the classification of beef, pig and sheep carcases and the reporting of prices thereof. Off. J. Europ. Union.

Daszkiewicz, T., Wajda, S. (2002). Wartość rzeźna oraz jakość mięsa buhajków rasy czarno-białej i limousine [Slaughter value and meat quality of Black and White and Limousin bulls]. Rocz. Inst. Przem. Mięs. Tłuszcz., 39, 17–25 [in Polish].

Gigli, S., Vincenti, F., Iacurto, M., Saltalamacchia, F. (2007). Variability in quality traits of traditional processed meat from young bulls – breed and environment effects. Rocz. Nauk. PTZ, 3(4), 309–315.

Gil, Z., Adamczyk, K., Golonka, M., Zapletal, P., Choroszy, Z. (2007). Przewidywanie wydajności rzeźnej skupowanego bydła na podstawie wybranych cech oceny przyżyciowej [Prediction of dressing percentage in young cattle based on pre-slaughter evaluation of selected traits]. Rocz. Nauk. Zootech., 34(1), 13–19 [in Polish].

Janiszewski, P. Borzuta, K., Lisiak, D., Powałowski, K., Samardakiewicz, Ł. (2015). Wpływ klas uformowania i otłuszczenia tusz na pH mięsa wołowego oraz charakterystyka struktury skupy bydła krajowego [Effect of carcass conformation and fatness on beef pH and characterization of the purchase structure of domestic beef cattle]. Rocz. Nauk. PTZ, 11(4), 65–74 [in Polish].

Litwińczuk, Z., Chabuz, W., Domaradzki, P., Jankowski, P. (2012). Slaughter value of young Polish Black-and-White, White-Backed, Polish Holstein-Friesian and Limousin bulls under semi-intensive fattening. Ann. Anim. Sci., 12, 2, 159–168.

Miciński, J., Klupczyński, J., Ostoja, H., Cierach, M., Dymnicka, M., Łozicki, A., Daszkiewicz, T. (2005). Wpływ rasy i żywienia buhajków na wyniki klasyfikacji ich tusz w systemie EUROP oraz ocenę tekstury mięsa [The effect of breed and feeding of young bulls on the classification results of their carcasses under the EUROP system and on the evaluation of their meat texture]. Żyw. Nauk. Technol. Jakość, 3(44) Supl., 147–156 [in Polish].

Młynek, K., Litwińczuk, Z. (2003). Kształtowanie się przemian nukleotydów oraz cech jakości rzeźnej i histologicznej mięsa mieszańców z buhajami ras mięsnych ubijanych przy różnej masie ciała [Formation of nucleotide transformation, slaughter quality traits and histological traits of meat of crossbreeds with meat breed bulls that were slaughtered at different body mass]. Acta Sci. Pol. Zootech., 2(1), 29–34 [in Polish].

Nogalski, Z., Wroński, M., Wielgosz-Groth, Z., Purwin, C., Sobczuk-Szul, M., Mochol, M., Pogorzelska, P. (2013). The effect of carcass conformation class (EUROP system) on the slaughter quality of young crossbred beef bulls and Holstein-Friesians. Ann. Anim. Sci. 13(1), 121–131.

Oler, A., Chaberski, R., Krężel, S. (2004). Wpływ składu dawki pokarmowej w żywieniu buhajków na jakość tusz i wołowiny [Effects of the ration composition on carcass and beef quality of young bulls]. Zesz. Nauk. Akad. Rol. Wroc., 501, 211–216 [in Polish].

Rynek Wołowiny i Cielęciny [Beef and Veal Market], Biuletyn informacyjny, Departament Rynków Rolnych Ministerstwa Rolnictwa i Rozwoju Wsi, Warszawa, 2014 [in Polish].

SAS Institute Inc.: SAS/STAT® 9.1 User's Guide. Cary. NC: SAS Institute Inc., 2014.

Schöne, F., Kirchheim, U., Kinast, C., Waßmut, R., Reichardt, W. (2006). Qualität des Fleisches von Jungbullen. Fleischwirtschaft, 11, 101–107.

Śmiecińska, K., Wajda, S. (2008). Jakość mięsa krów zaliczonych w klasyfikacji poubojowej EUROP do różnych klas [Meet quality of cows rated among different grades under the post slaughter EUROP classification system]. Żyw. Nauk. Technol. Jakość, 3(58), 57–66 [in Polish].

Wajda, S., Borzuta, K. (2011). Biologiczna ewolucja krajowej populacji zwierząt rzeźnych. Część II. Monografia naukowa pod redakcją Tyszkiewicza S. i Witkowskiej H.: Innowacyjność gospodarki w Polsce [Biological evolution of the national population of animals for slaughter. Part II. Monograph edited by S. Tyszkiewicz and H. Witkowska: Innovation of the Polish economy]. Stowarzyszenie Naukowo-Techniczne Inżynierów i Techników Przemysłu Spożywczego, Warszawa, 50–70 [in Polish].

Wajda, S., Burczyk, E., Winarski, R., Daszkiewicz, T. (2011). Wskaźnik wydajności rzeźnej buhajków i jego związek z wartością handlową tusz [Indicator of young bulls slaughter yield and its reference to the commercial value of carcasses]. Żyw. Nauk. Technol. Jakość, 4(77), 94–102 [in Polish].

Wajda, S., Kondratowicz, J., Burczyk, E., Winiarski, R. (2014). Wydajność rzeźna i jakość mięsa buhajków zakwalifikowanych w systemie EUROP do różnych klas uformowania [Slaughter value and quality of meat from beef carcasses classified to different conformation classes in EUROP system]. Żyw. Nauk. Technol. Jakość, 4(95), 136––147 [in Polish].

Wiegand, D., Schnäckel, W., Schnäckel, D., Fahr, R., Knape, Ch., Heckenberger, G. (2006). Fleisch qualität von Rindern aus extensiver Weidehaltung. Fleischwirtschaft, 1, 98–104.

WPŁYW WIEKU I PŁCI UBIJANEGO BYDŁA NA WYDAJNOŚĆ RZEŹNĄ I WYNIKI KLASYFIKACJI EUROP

Streszczenie. Wpływ kategorii tusz wołowych na wydajność rzeźną i wyniki klasyfikacji EUROP oszacowano na przykładzie 2627 osobników ubitego bydła, wykorzystując procedury FREQE oraz GLM (SAS). Stwierdzono, że najliczniejszymi kategoriami bydła rzeźnego były buhaje (30%) oraz buhajki i krowy (po ok. 28). Najliczniejszą klasą uformowania tusz (71,91%) we wszystkich kategoriach była klasa O, następnie R (15,07%), P (11,88%) i U (1,14%). Wykazano umiarkowane otłuszczenie tusz buhajów, zarówno kategorii wiekowej A, jak i B. Wywnioskowano także, że tusze buhajków zazwyczaj charakteryzowały się mniejszym otłuszczeniem, w porównaniu z tuszami jałówek. Stwierdzono zbliżoną wartość współczynnika wydajności rzeźnej buhajków (kategoria A) w porównaniu z jałówkami (kategoria E) (przy $P \leq 0{,}01$), a zatem w przypadku młodego bydła rzeźnego wykazano brak potwierdzonego statystycznie wpływu płci na wydajność. Czynnik wieku w przypadku ubijanych samic (kategorie D i E) znacznie bardziej niż w przypadku ubijanych samców (kategorie A i B) różnicował ($P \leq 0{,}01$) wartości wydajności rzeźnej.

Słowa kluczowe: bydło rzeźne, wydajność rzeźna, klasyfikacja EUROP

Accepted for print: 23.12.2016

For citation: Janiak, M., Sawa, A., Bogucki, M. (2016). Effect of age and sex of slaughtered cattle on dressing percentage and EUROP classification results. Acta Sci. Pol. Zootechnica, 15(4), 41–54. DOI: 10.21005/asp.2016.15.4.04