ISSN 1644-0714
ISSN 2300-6145 (online)
DOI:10.21005/asp.2016.15.1.05
www.asp.zut.edu.pl

ACTA SCIENTIARUM POLONORUM *Acta Sci. Pol. Zootechnica 15(1) 2016, 53–64*

THE IMPACT OF SEASON OF BIRTH AND AGE OF BOARS OF POLISH LANDRACE BREED ON BREEDING OPERATION RESULTS

Kazimierz Pokrywka[1]✉, Krzysztof Tereszkiewicz[2], Piotr Molenda[3]

[1]Department of Commodity Science, State Higher Vocational School in Krosno, Dmochowskiego 12, 38-400 Krosno, Poland
[2]Faculty of Management, Rzeszow University of Technology in Rzeszow, al. Powstańców Warszawy 8, 35-959 Rzeszów, Poland
[3]Faculty of Biology and Agriculture, University of Rzeszow in Rzeszow, al. Rejtana 16c, 35-959 Rzeszów, Poland

Abstract. The aim of the study was to assess the impact of season of birth and breeding of boars of Polish Landrace breed on their insemination efficiency. The study material consisted of 35 589 ejaculates collected between 1994–2013 from 330 of Polish Landrace breed boars farmed in Małopolska Biotechnology Centre, the Examination Station of Boars in Czermin. Ejaculates were marked with: volume of ejaculate, without spermatozoid fraction, percentage of progressive spermatozoids, concentration o spermatozoids, the general number of spermatozoids in the ejaculate, number of insemination doses and value of one ejaculate. The conducted studies demonstrate a significant impact of interaction between the season of birth and the age of boar in the process of development of all the physical parameters of semen in Polish Landrace breed boars. The studies have shown that the highest reproduction potential, demonstrated with the number of insemination doses collected (26.96), was found in the oldest boars born during summer season. The results of studies indicate that quantitative and qualitative parameters of semen of the Polish Landrace breed boars mainly depend on their age. The highest variability affecting the characteristics of ejaculates, resulting from the effect of boars' age, was found for the ejaculate volume of (86.14%), whereas impact of birth season was marked by the percentage of spermatozoids with inferior changes (61.64% of the variability).

Key words: boar, Polish Landrace breed, semen, season birth, age

✉kpok-wka@wp.pl

INTRODUCTION

The optimal level of utilization of the productive potential of livestock is a prerequisite for its efficient use regardless of realized production course. The most important is the proper use of the potential of animals in activities related to the conduct of reproduction and especially in the production of biological material used for insemination. In addition, in the use of breeding boars the proper organization of the production and distribution is a necessity which is associated with a very short shelf life of semen for insemination of sows. Previous attempts of long-term preservation of boar sperm have not given satisfactory results associated with their implementation into practice. Consequently the insemination of sows is subjected to a diluted, short preserved liquid seed, ready for 7–10 days to be used only [Milewska 2007].

These conditions significantly increase operating costs of insemination centres. One of the ways of cost reduction is to optimize the management of important factors of produced sperm parameters. The previous studies [Wolf and Smital 2009, Szostak and Sarzyńska 2010, Kunowska-Slósarz and Makowska 2011, Wilczyńska et al. 2013, Knecht et al. 2014b] have shown that the semen collected from boars insemination stations is highly variable both in terms of quantitative parameters related to its volume and also qualitative parameters depending on the characteristics of spermatozoids and their concentration. The major factors determining semen parameters are breed and the genotype. Boars of individual races or their interracial hybrids exhibit differences in ejaculate volume, sperm concentration and its motility [Brucka-Jastrzębska et al. 2008, Wilczyńska et al. 2013]. These semen parameters also affect the RYR1 gene polymorphism [Kmieć et al. 2003, Szczepankiewicz and Lechniak 2005]. Better semen quality parameters, expressed in volume of ejaculate, share of live sperm and number of insemination doses obtained are specific for boars with genotype TT [Kmieć et al. 2003]. The studies also showed the influence of physiological factors including the age-related. The most of the authors agree that the optimum reproductive performance of male domestic pig falls on the age of two–three years [Kondracki et al. 2000, Szostak 2003]. In addition, sperm quality is determined by environmental factors, among which particularly important is season when boars are used for breeding [Milewska and Falkowski 2004, Pokrywka and Ruda 2004, Banaszewska et al. 2007, Adamiak et al. 2010, Kunowska-Slósarz and Makowska 2011, Knecht et al. 2013, Marchev and Szostak 2013, Wilczyńska et al. 2013, Knecht et al. 2014b]. Seasonal fluctuations are primarily reflected by reduction of libido of breeding boars in the summer, mainly due to the thermal conditions. It was also shown that individual characteristics of boars have an impact on semen parameters [Muczyńska et al. 2010, Banaszewska and Kondracki 2012].

The recent studies [Owsianny et al. 2004, Pokrywka et al. 2009, Pokrywka and Tereszkiewicz 2011, Pokrywka et al. 2014, Knecht et al. 2014a] also attempt to determine the effect of season of birth boars. So far, it was found that boars born in the winter season have a higher reproductive potential than ones born in spring [Owsianny et al. 2004]. Similar relations have been by shown Knecht et al. [2014a] – they additionally point to better results of using breeding boars born in the summer. These observations were confirmed for both pure bred boars [Pokrywka et al. 2009, Pokrywka et al. 2014] as well as for crossbred boars [Pokrywka and Tereszkiewicz 2011]. The results of the studies indicate the multiple and intersectional determinants of boars' reproductive potential, most of which is explained in the scientific literature. However, a little has been done to determine the effects associated with the interaction of diverse factors that have impact on the results of the use of breeding boars.

The study attempted to estimate the impact of season of birth and age of boars on the value of the basic physical parameters and quality of insemination boars' semen.

MATERIAL AND METHODS

The study material consisted of 35 589 ejaculates collected between 1994 and 2013 from 330 of Polish Landrace breed boars farmed in Małopolska Biotechnology Centre, the Examination Station of Boars in Czermin. Ejaculates were collected manually and were assessed according to the methodology used in Insemination Stations. Ejaculates were marked with: volume of ejaculate not including spermatozoid fraction (ml), percentage of progressive spermatozoids (%), concentration o spermatozoids (thous $\cdot$ mm^{-3}), the general number of spermatozoids in the ejaculate (bilions), number of insemination doses (pieces) from one ejaculate – counted with use of SYSTEM SUL. Simultaneously the value of one of the one ejaculate was calculated by multiplication of the number of doses from one portion of sperm with its net price in 2013. For the morphological evaluation of sperm were used preparations coloured with nigrosin and eosin, which were evaluated by light microscopy. The sperm was separated to three groups – with regular shape, showing the major changes and inferior changes in accordance with the classification of Blom [1981] .

Parameters of ejaculates were analyzed statistically, taking into account the season of year of birth: spring (from March 22 to June 21), summer (from June 22 to September 21), fall (from September 22 to December 21), winter (from December 22 to March 21) and the same time the age of the boar at intervals, to 365 days, 366–730 days, 731–1095 days. The statistical analysis was performed basing on the calculated arithmetic means and standard deviations. In order to

determine the differences between groups of two factors of variation (the season of birth, age boar) was used a two factorial analysis of variance ANOVA / MANOVA for nonorthogonal system. Statistical deduction was conducted at two levels of significance $P \leq 0.01$ and $P \leq 0.05$ calculating the Least Significant Difference (LSD). For statistical calculations the Statistica (9.0) was used.

RESULTS AND DISCUSSION

Features of ejaculates obtained from boars born in different seasons with taking into account their age are summarized in (Table 1). The analysis of the ejaculate volume indicator has shown that the oldest boars born in summer had the highest value of this parameter. On the other hand the smallest volume of ejaculate was observed in youngest boars born in the spring. The authors [Kondracki et al. 2000, Szostak 2003, Smital 2009, Szostak and Przykaza 2010] report that the major factor that influences the volume of produced ejaculate is the age of the boar. It is believed that up to the age of about 20 months ejaculates show a dynamic trend of volume growth which is then stabilizing.

The effect of age of the boar on ejaculate volume was confirmed in the presented studies. It has been shown that this was the factor with the greatest impact on the amount of semen produced assessed of Polish Landrace breed boars (Fig. 2). With ageing boars the volume of produced ejaculates was increasing, however the particularly dynamic growth in the volume of produced ejaculates was reported in boars born in the spring. The influence of season of birth on the volume of ejaculate was less visible however it is important to mention that in a group of youngest and two years old boars the smallest volume of ejaculate was obtained from males born in the spring, same time the largest, from boars born in autumn (Table 1). It is worth noting that for young boars (aged less than one year) and those of two years old the largest volume of ejaculate respectively 236.19 ml and 268.50 ml was found in boars born in the autumn. According to Knecht et al. [2014a] season of birth of Polish Landrace breed boars considerably affects the volume of boar's semen. The authors found that significantly larger amounts of sperm were produced by boars born in the autumn season and the smallest amounts by the ones born in the winter season. In the previous studies [Pokrywka et al. 2014] carried out on boars of Polish Landrace breed, it was established that ejaculates of statistically significantly greater volume were obtained from boars born in summer and autumn seasons.

According to the recommendations the percentage of progressive sperm in the semen of boars should not be lower than 60%. The study shows that the semen of all groups meets this requirement. A stable, and the highest (over 68%) participation of progressive sperm was found in boars born in summer season, regardless of

age (Table 1). Similar results were found in other studies [Pokrywka et al. 2014] in which it was found that Polish Landrace breed boars born in the summer season characterised with a higher proportion of progressive sperm when compared to boars born in other seasons. Simultaneously the greatest variability of this parameter was observed between the age groups of boars born in the spring season. It was also noted that with age the value of this parameter was statistically highly reduced. Similar dependence was observed in boars born in the winter season. The further analysis shows that there was observed a reduction of the concentration of spermatozoa parameter is closely connected with age. This occurrence was con-

Table 1. The impact of season of birth and age on characteristics semen of Polish Landrace breed boars

Tabela 1. Wpływ sezonu urodzenia i wieku na cechy nasienia knurów rasy polskiej białej zwisłouchej

Trait – Cecha	Season of birth [A] Sezon urodzenia [A]	Age of boar ($\bar{x}$ ±SD), days [B] Wiek knura ($\bar{x}$ ±SD), dni [B]			A × B	$LSD_{0.05}$ $NIR_{0.05}$	$LSD_{0.01}$ $NIR_{0.01}$
		< 365	366–730	731–1095			
Ejaculate volume, ml Objętość ejakulatu, ml	spring – wiosna	206.82 ±76.15	243.25 ±85.16	270.37 ±99.36	**	5.98	9.37
	summer – lato	228.96 ±103.82	260.88 ±96.90	286.08 ±98.31			
	autumn – jesień	236.19 ±97.92	268.50 ±98.99	285.84 ±93.85			
	winter – zima	232.62 ±97.29	250.33 ±97.89	267.37 ±102.88			
Percentage of progressively motile spermatozoa, % Odsetek plemników o ruchu postępowym, %	spring – wiosna	68.35 ±5.58	67.75 ±5.64	66.64 ±6.58	**	0.36	0.57
	summer – lato	68.37 ±5.89	68.49 ±5.05	68.48 ±5.19			
	autumn – jesień	68.05 ±5.85	67.57 ±5.90	67.97 ±5.33			
	winter – zima	68.77 ±3.60	67.23 ±7.12	67.10 ±6.28			
Concentration of spermatozoa, thous · mm^{-3} Koncentracja plemników, tys. · mm^{-3}	spring – wiosna	468.28 ±134.52	442.02 ±123.90	434.60 ±143.12	**	8.69	13.63
	summer – lato	456.10 ±163.22	444.20 ±145.03	426.11 ±127.92			
	autumn – jesień	467.02 ±139.55	457.07 ±136.59	428.61 ±133.31			
	winter – zima	446.01 ±135.78	460.77 ±145.45	457.78 ±154.57			
Total number of spermatozoa per ejaculate, bln Ogólna liczba plemników w ejakulacie, mld	spring – wiosna	65.93 ±22.54	72.36 ±22.93	75.70 ±23.67	**	1.44	2.55
	summer – lato	65.90 ±20.81	75.68 ±24.66	81.56 ±25.96			
	autumn – jesień	70.80 ±23.31	78.33 ±22.01	79.41 ±22.92			
	winter – zima	68.95 ±19.80	77.80 ±22.71	79.04 ±23.98			
Number of insemination doses Liczba dawek inseminacyjnych	spring – wiosna	21.71 ±7.25	23.93 ±7.30	24.95 ±7.39	**	0.46	0.72
	summer – lato	21.80 ±6.75	25.05 ±7.97	26.96 ±8.21			
	autumn – jesień	23.36 ±7.35	25.92 ±6.99	26.26 ±7.22			
	winter – zima	23.05 ±6.58	25.82 ±7.25	26.19 ±7.55			

A × B – Interaction A × B; ** significance of differences ($P \leq 0.01$).
A × B – Interakcja A × B; ** istotność różnic ($P \leq 0{,}01$).

firmed in three birth seasons. Only the boars born in winter characterized with the increase of sperm concentration in the second year of age (Table 1).

The studies have shown that with age the total number of spermatozoa in the ejaculate increased, which was confirmed in all birth seasons. However the most preferred value of this feature was found in boars born in summer and autumn. The highest total number of sperm in the ejaculate in group of younger boars (less than one year and two-years old) was recorded in the autumn season of birth. The average values of this feature were significantly more valuable in comparison with boars of the same age, but born at other seasons of the year. Influence of season of birth on the overall count of sperm in the ejaculate of Polish Landrace breed boars confirmed Knecht et al. [2014a] where according to their studies the most favourable value of this parameter was observed in boars born during the summer season.

Focusing on the number of insemination doses being produced as measurable indicator of insemination with use of breeding boars in the studies [Pokrywka et al. 2009, Pokrywka and Tereszkiewicz 2011] it has been shown that it is possible to produce more than 25 servings of semen from one ejaculate collected from boars after their first year of life and were born in the summer, autumn and winter season. It is worth noting that these boars sustained a high production results expressed in the number of insemination doses, even after passing two years of their age. In this period of life it was possible to get more than 26 insemination doses form their semen. In the group of younger boars (less than one year old) the preferred level of this parameter was found in boars born in autumn and winter seasons. From these subjects it was obtained over 23 portions of the seed from one ejaculate (Table 1). Taking into consideration the number of servings produced as the most reliable criterion for the technical-economic assessment of the effects of the use of breeding boars in insemination stations it should be recommended to use boars born in autumn and winter seasons.

These observations were confirmed with use of the value criterion of produced insemination doses from a single ejaculate, as a parameter which is derived from the number of servings of sperm (Fig. 1).

This index was in the range from 431 PLN (boars born in the spring under the age of one year) to 539 PLN (boars born in the summer at the age of two to three years). It should be emphasized that the high value of semen was obtained from mature boars that were older than two years and born in the summer, autumn or winter seasons. Given the rate of insemination doses produced, the worst results were found in boars born in the spring season. These results correspond with previously published results of own studies [Pokrywka et al. 2014].

According Kondracki and Wysokiński [2005] semen of young boars as well as old ones, over three years, has a worse morphological image with stronger

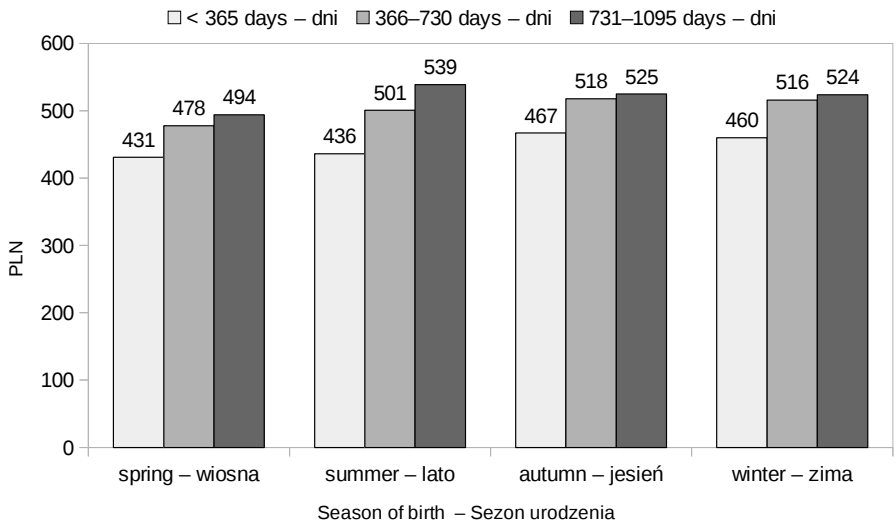

Fig. 1. The impact of season of birth and age of Polish Landrace breed on the value of one ejaculate

Rys. 1. Wpływ sezonu urodzenia i wieku na wartość jednego ejakulatu knurów rasy polskiej białej zwisłouchej

participation of sperm with major and inferior changes. Szostak [2003] also states that ejaculates with good morphological characteristics are obtained between one and three years of age of boars. In other studies [Szostak and Buryś 2011] it was reported that the age of boar does not affect the quality of semen, expressed as percentage of spermatozoa with morphological changes. In contrast Pokrywka et al. [2014] obtained the most favourable morphological sperm which was collected from boars born in the summer. In our study, these results were confirmed only partially. It has been shown that the semen of the youngest boars – those aged less than one year exhibited a very low proportion of sperm with abnormal structure. However, it should be noted that in some cases in the group of youngest boars the fraction of spermatozoa with morphological changes was even smaller than in groups of older boars (Table 2).

The most preferred morphological image of sperm was found in boars aged less than one year, born in the summer season. It should also be emphasized that morphological image of sperm from all evaluated groups of boars was correct or even very good, as both the percentage of sperm with major as well as ones with inferior changes was low and did not exceed the recommended values. According to Blom [1981] the acceptable maximum share of spermatozoa with major changes is 15%, while the interior changes 10–15%.

Table 2. The impact of season of birth and age, on the morphological features of semen of Polish Landrace breed boars

Tabela 2. Wpływ sezonu urodzenia i wieku na cech morfologiczne nasienia knurów rasy polskiej białej zwisłouchej

Trait – Cecha	Season of birth [A] Sezon urodzenia [A]	Age of boar ($\bar{x}$ ±SD), days [B] Wiek knura ($\bar{x}$ ±SD), dni [B]			A × B	$LSD_{0.05}$ $NIR_{0.05}$	$LSD_{0.01}$ $NIR_{0.01}$
		< 365	366–730	731–1095			
The percentage of spermatozoids with major changes, % Odsetek plemników ze zmianami głównymi, %	spring – wiosna	1.58 ±0.18	1.56 ±0.94	3.60 ±0.78	NS	0.24	0.39
	summer – lato	0.43 ±0.06	1.01 ±0.73	0.61 ±0.27			
	autumn – jesień	1.35 ±0.52	2.84 ±0.95	2.64 ±0.65			
	winter – zima	1.19 ±0.40	3.82 ±0.65	4.31 ±0.62			
The percentage of spermatozoids with subordinate changes, % Odsetek plemników ze zmianami podrzędnymi, %	spring – wiosna	1.82 ±0.41	2.53 ±0.74	3.37 ±0.49	NS	0.25	0.39
	summer – lato	1.02 ±0.88	2.03 ±0.41	1.40 ±0.41			
	autumn – jesień	2.20 ±0.55	6.73 ±0.85	4.48 ±0.51			
	winter – zima	2.46 ±0.22	3.99 ±0.92	4.28 ±0.72			

A × B – Interaction A × B; NS – difference not significant.
A × B – Interakcja A × B; NS – różnica nieistotna.

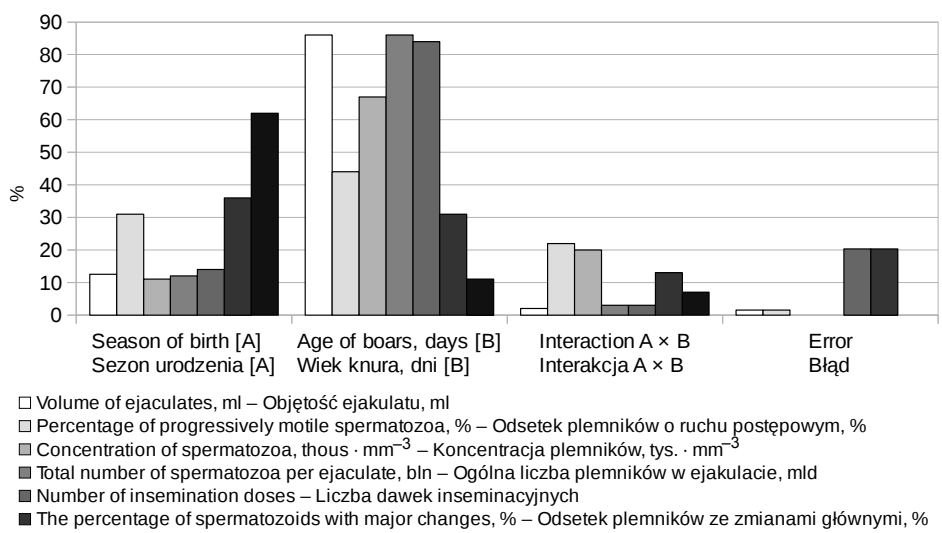

Fig. 2. The share component of variability in shaping of parameters of the sperm collected from Polish Landrace breed boars (the average squared deviations are expressed in % of their total number)

Rys. 2. Udział komponentów zmienności w kształtowaniu, jakości ejakulatów knurów rasy polskiej białej zwisłouchej (średnie kwadraty odchyleń w % ich sumy)

Studies have shown that the quantitative – quantitative parameters of Polish Landrace breed boar's semen depended majorly on the age of boars (Fig. 2). The variability coming from the effects of age of boars accounted for 10.96% (percentage of sperm with inferior changes) to 86.14% (volume of ejaculate).

The consequence of age of boar very clearly (86.11% of the variance) affected the total number of sperm in the ejaculate and also the number of insemination doses obtained from one the ejaculate (84.66% of the variance). In contrast, the influence of season of birth influenced the parameters as: the percentage of progressive sperm (30.53%), the percentage of spermatozoa with major changes (36.99) and the percentage of sperm with inferior changes (61.64%). Season of birth in a greater extent (by over 60%) than the age boar shaped measure of the percentage of sperm with inferior changes (Fig. 2).

CONCLUSIONS

The study demonstrates that there a exists a statistically significant interaction between season of birth and age on the features of ejaculates of Polish Landrace breed boars. As it was presented, the highest procreative potential, expressed with the number of insemination doses (26.96) collected was found in the oldest boars born in the summer season.

What is more, the significant differences between the results of breeding efficiency associated with the season of birth and the age of boar indicate that these factors must be taken into account when choosing males for stations of insemination of sows.

REFERENCES

Adamiak, A., Kondracki,S., Wysokińska, A. (2010). Wpływ pory roku na właściwości fizyczne ejakulatu knurów ras wbp i pbz [Influence of season of the year on physical properties of ejaculates from Polish Large White and Polish Landrace boars]. Rocz. Nauk. Zootech., 37(2), 159–167 [in Polish].

Banaszewska, D., Kondracki, S. (2012). An assessment of the breeding maturity of insemination boars based on ejaculate quality changes. Folia Biol., 60(3–4), 151–162.

Banaszewska, D., Kondracki, S., Wysokińska, A. (2007). Wpływ sezonu na zmiany w budowie morfologicznej plemników wybranych ras knurów inseminacyjnych [The influence of the season on the sperm morphology Young boars used for insemination]. Acta Sci. Pol., Zootechnica, 6(2), 3–14 [in Polish].

Blom, E. (1981). Ocena morfologiczna wad plemników buhaja II. Propozycja nowej klasyfikacji wad plemników [Morphological evaluation of bull spermatozoa abnormalities. II. Proposal of a new classification of spermatozoa abnormalities]. Med. Weter., 37(4), 239–242 [in Polish].

Brucka-Jastrzębska, E., Białek, M., Brzeźińska, M., Kawczuga, D., Drewnowski, W., Lisiecki, L. (2008). Parametry ejakulatu w zależności od rasy świń [Semen parameters in relation to pig breed]. Med. Weter., 64, 1248–1251 [in Polish].

Kmieć, M., Dybus, A., Wierzbicki, H., Terman, A., Ziemak, J. (2003). Analysis of relations between polymorphism in ryanodine receptor gene (RYR1) and certain characters of boar semen in polish landrace pigs. Acta Sci. Pol., Zootechnica, 2(1), 21–28.

Knecht, D., Środoń, S., Szulc, K., Duziński, K. (2013). The effect of photoperiod on selected parameters of boar semen. Livest. Sci., 157, 364–371.

Knecht, D., Środoń, S., Duziński, K. (2014a). Does a boar's season of birth determine semen parameters and reproductive performance? Reprod. Dom. Anim., 49(2), 183––190.

Knecht, D., Środoń, S., Duziński, K. (2014b). The influence of boar breed and season on semen parameters. Afr. J. Anim. Sci., 44(1), 1–9.

Kondracki, S., Wysokińska, A., Paplińska, A. (2000). Wpływ wieku na cechy nasienia młodych knurów rasy wielkiej białej polskiej [Influence of the age on semen indices of young Polish Large White boars]. Zesz. Nauk. Prz. Hod., 48, 103–110 [in Polish].

Kondracki, S., Wysokińska, A. (2005). Charakterystyka zmian w budowie morfologicznej plemników knura, z uwzględnieniem wieku i rasy rozpłodnika [Characterization of sperm abnormalities of boars with regard of age breed]. Folia Univ. Agric. Stetin. Zootechnica, 243(47), 97–104 [in Polish].

Kunowska-Slósarz, M., Makowska, A. (2011). Effect of breed and season on the boars semen characteristics. Ann. Wars. Univ. Life Sc. – SGGW, Anim. Sci., 49, 77–86.

Marchev, Y., Szostak, B. (2013). The season effect on sexual behavior and sperm quality of East-Balkan boars. Acta Sci. Pol., Zootechnica, 12(2), 31–38.

Milewska, W. (2007). Ocena przyżyciowa knurów rasy hampshire i pietrain oraz mieszańców dwurasowych a efekty użytkowania rozpłodowego w stacjach użytkowania loch [Intravital assessment traits and reproductive results of purebred Hampshire and Pietrain boars and crossbred boars raised at insemination stations]. Med. Weter., 63(6), 708–711 [in Polish].

Milewska, W., Falkowski, J. (2004). Effects of season on selected semen traits in purebred and crossbred boars. Anim. Sci. Pap. Rep., 22(Suppl. 3), 289–295.

Muczyńska, A., Kondracki, S., Wysokińska, A. (2010). Zmienność międzyrasowa cech fizycznych ejakulatów knurów użytkowanych w stacji unasieniania loch [Between-breed variation in physical characteristics of ejaculates from boars used in Sow Insemination Station]. Rocz. Nauk. Zootech., 37(2), 151–157 [in Polish].

Owsianny, J., Fiałkowska, B., Kawęcka, M., Czarnecki, R., Matysiak, B. (2004). Porównanie cech wartości rozpłodowej knurów linii 990 urodzonych w sezonie wiosennym i jesiennym [Comparison of reproductive value traits in 990 Line boars born in spring and autumn]. Zesz. Nauk. Prz. Hod., 72(2), 77–83 [in Polish].

Pokrywka, K., Ruda, M. (2004). Wpływ sezonu eksploatacji na wybrane wskaźniki ilościowe i jakościowe nasienia knurów rozpoczynających użytkowanie w różnym wieku [The effect of performance season on the chosen quantitative and qualitative indices of boar semen depending on the age of the first ejaculate collection]. Zesz. Nauk. Prz. Hod., 72(2), 85–93 [in Polish].

Pokrywka, K., Ruda, M., Tereszkiewicz, K. (2009). Jakość ejakulatów knurów czystorasowych urodzonych w różnych porach roku [The quality of ejaculates of purebred

boars born in different season of the year]. Acta Sci. Pol., Zootechnica, 8(4), 33–40 [in Polish].

Pokrywka, K., Tereszkiewicz, K. (2011). The influence of the season of the birth of Duroc and Pietrain boars and their crossbreeds on sperm traits. Acta Sci. Pol., Zootechnica, 10(3), 65–72.

Pokrywka, K., Tereszkiewicz, K., Ruda, M. (2014). The impact of season of birth and breeding of boars of Polish Landrace breed on their insemination efficiency. J. Centr. Eur. Agr., 15(3), 272–283.

Smital, J. (2009). Effects influencing boar semen. Anim. Reprod. Sci., 110, 335–346.

Szczepankiewicz, D., Lechniak, D. (2005). Gen receptora rianodiny (RyR1) – polimorfizm i związek z rozrodem świni domowej [Ryanodine receptor gene (RyR1): its polymorphism and relation to pig reproduction]. Med. Weter., 61(3), 262–265 [in Polish].

Szostak, B. (2003). Wpływ genotypu, wieku knura i sezonu eksploatacji na wybrane cechy ejakulatów [The effect of genotype, age of boar and season of use on the selected qualities of ejaculates]. Zesz. Nauk. Prz. Hod., 68(2),147–155 [in Polish].

Szostak, B., Przykaza, Ł. (2010). Wpływ rasy i wieku młodych knurów na wybrane cechy ich nasienia [The influence of breed and age of young boars the selected traits of their semen]. Acta Sci. Pol., Zootechnica, 9(3), 93–100 [in Polish].

Szostak, B., Sarzyńska, J. (2010). Wpływ rasy i wieku na obecność wybranych wad morfologicznych plemników w nasieniu knurów [The influence of the breed and age of boars on the occurrence of selected morphological defects of sperm in semen]. Acta Sci. Pol., Zootechnica, 9(4), 231–238 [in Polish].

Szostak, B., Buryś, Ł. (2011). Effect of breed and age on the morphology of A.I. boars spermatozoa. Ann. Univ. Mariae Curie-Skłodowska, Sect. EE, Zootechnica, XXIX (2), 44–51.

Wilczyńska, E., Kondracki, S., Wysokińska, A., Kowalewski, D., Gajownik, K. (2013). Jakość nasienia knurów ras wbp, pbz, duroc i pietrain w poszczególnych miesiącach roku [The quality of boar semen of Polish Large White, Polish Landrace, Duroc and Pietrain breeds in different months of the year]. Rocz. Nauk. PTZ, 9(1), 49–56 [in Polish].

Wolf, J., Smital, J. (2009). Quantification of factors affecting semen traits in artificial insemination boars from animal model analyses. J. Anim. Sci., 87, 1620–1627.

WPŁYW SEZONU URODZENIA I WIEKU KNURÓW RASY POLSKA BIAŁA ZWISŁOUCHA NA WYNIKI EKSPLOATACJI ROZPŁODOWEJ

Streszczenie. Celem badań była ocena wpływu sezonu urodzenia i wieku knurów rasy polskiej białej zwisłouchej na wyniki rozrodu. Materiał do badań stanowiło 35 589 ejakulatów pozyskanych w latach 1994–2013 od 330 knurów rasy polska biała zwisłoucha użytkowanych w Małopolskim Centrum Biotechniki, Stacja Eksploatacji Knurów w Czerminie. Pozyskane materiały oceniano na podstawie: objętości ejakulatu bez frakcji galaretowatej, odsetka plemników o ruchu postępowym, koncentracji plemników, ogólnej liczby plemników w ejakulacie, liczby dawek inseminacyjnych oraz ich wartość uzyskanej z jednego ejakulatu. W badaniach stwierdzono statystycznie wysoko istotne współdziałanie sezonu urodzenia i wieku na cechy nasienia knurów rasy polskiej białej zwisłouchej. Wykazano, że najwyższym potencjałem reprodukcyjnym wyrażonym liczbą pozyskanych dawek inseminacyjnych (26,96), charakteryzowały się knury najstarsze urodzone w sezonie letnim. W badaniach wykazano, że parametry ilościowo jakościowe nasienia knurów rasy pbz uzależnione były głównie od wieku knurów. Najwyższą zmienność wpływającą na cechy ejakulatów wynikającą z wpływu wieku knurów stwierdzono dla objętość ejakulatów (86,14%), natomiast wpływ sezonu urodzenia zaznaczył się dla odsetka plemników ze zmianami podrzędnymi (61,64% zmienności).

Słowa kluczowe: knury, polska biała zwisłoucha, nasienie, sezon urodzenia, wiek

Accepted for print: 20.12.2015

For citation: Pokrywka, K., Tereszkiewicz, K., Molenda, P. (2016). The impact of season of birth and age of boars of Polish Landrace breed on breeding operation results. Acta Sci. Pol. Zootechnica, 15(1), 53–64.