

THE INFLUENCE OF IMPORTED STALLIONS ON THE POPULATION OF POLISH COLD-BLOODED HORSES EXEMPLIFIED ON SWEDISH ARDEN ROLLTAN

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Abstract. The population of Polish cold-blooded horses has been bred on the basis of native female material using western cold-blooded stallions. The aim of this study was to evaluate the impact of imported cold-blooded stallions on the Polish cold-blooded horses population on the example of the Swedish Arden – stallion Rolltan. The study involved the offspring of stallion Rolltan, Swedish Arden, a total of 63 stallions and 67 mares, born in Poland in 1989–2006. For comparative purposes, the analysis included also the offspring of 9 selected stallions of Polish cold-blooded horse, a total of 149 males and 248 females. The analysis of the exterior has shown higher average values at chest circumference by 2.4 cm and cannon circumference by 0.4 cm in Rolltan's sons and higher average values at withers height by 0.1 cm, chest circumference by 2.1 cm and cannon circumference by 0.2 cm in Rolltan's daughters than in the offspring of the selected stallions of Polish cold-blooded horses. A higher bonitation score of Rolltan's sons by 0.3 points and daughters by 0.5 points indicates that they had better conformation and movement than the offspring of selected stallions of Polish cold-blooded horses. The analyses showed also the occurrence of different coat colors specific to cold-blooded horses, mainly chestnut and bay. Results of the study, years of experience of the authors of the present study and the views of people associated with the horse breeding practice enable concluding that the breeding of Polish cold-blooded horses should be supplied with imported Swedish Arden stallions of good quality.

Key words: cold-blooded horses, imported stallions, zoometric parameters, bonitation score

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INTRODUCTION

The population of Polish cold-blooded horse has been bred on the basis of native female material using western cold-blooded stallions [Wilczak 1989, 1996, Budzyński and Kamieniak 1997, Piłkuła et al. 1999, Krasowska and Świgoń 2001, Jastrzębska 2007b, Jastrzębska and Bruski 2010]. By tracing breed history it is difficult to state who and when has brought the first cold-blooded horses to Poland, as in the Poland of the XVII-th and XVIII-th century there has been general avocation for the breeding of warm-blooded horse [Prawocheński 1922]. In turn, in peasant holdings use was made of Mierzyn Horses, a large population of which occurred in the north-eastern areas of Poland until the year 1920. Nevertheless, owing to their low body weight, these primitive horses could not always be exploited for transport or heavier field works, which prompted farmers to search for heavier and sturdier horses of the cold-blooded type [Nozdryn-Plotnicki 1966]. Initially, only landlords were dealing with the import of horses as only they had means to purchase reproductive material. A serious problem that impaired the development of cold-blooded horse breeding in the XIX-th century was a lack of good-quality stallions used in breeding and diversity of the imported breeds of draft horses [Chachuła and Rudowski 1967, Chrzanowski et al. 1989]. Initially, the import included Percheron, and then Arden and to a lesser extent Belgian and Breton horses [Chachuła 1967, Piłkuła et al. 1999, Rajca-Pisz 2005].

The Polish cold-blooded horses are a phenotypically-standardized breed of animals, usually of very good quality, whose population in the last two decades represents over 50% of the population of all horses bred in Poland [Łojek 2000, Jastrzębska 2007a, Jastrzębska and Kowalska 2007]. Among the imported cold-blooded horses, the best offspring was achieved from mating native mares with high-quality Arden stallions from Sweden [Wilczak 1989, Budzyński et al. 1995, 2000]. These include stallion Rolltan born on the 27th May 1985 in Snoggedal, Sweden, at the P. Kjell Nord breeding center. A father of Rolltan was Rollman after Rolle, and a mother was Tansy after Tamor. At the age of 2.5 years, the stallion had chestnut coat color and the following biometric parameters: withers height – 160 cm, chest circumference – 205 cm, cannon circumference – 27.5 cm, whereas after verification, the respective parameters were at: 167 – 225 – 28 cm. Its high quality was indicated by 82 bonitation scores achieved in its studbook record. In order to improve the phenotype of the Polish cold-blooded horse and to avoid excessive relatedness of the breed, in 1988 the stallion Rolltan was purchased to the State Stud Farm in Kętrzyn [Karpeta et al. 2004, Kondratiuk 2012]. It was highly desirable by breeders, which was indicated by the long total length of its breeding use and the number of covered mares.

This study was aimed at evaluating the impact of imported cold-blooded stallions on the Polish cold-blooded horse population on the example of the Swedish

Arden – stallion Rolltan. In-depth analysis concerned zoometric and breeding evaluation of the offspring of Rolltan that was compared with the offspring of selected Polish cold-blooded stallions.

MATERIAL AND METHODS

The study included the offspring of stallion Rolltan, Swedish Arden, a total of 63 stallions and 67 mares, born in Poland in the years 1989–2006. For comparative purposes, the analysis included also the offspring of selected stallions of Polish cold-blooded horse (Bilet, Brażowy, Brydź, Butler, Marabut, Salniak, Sektor, Senior, Sondaż) including a total of 149 males and 248 females. The time of breeding use of all the stallions selected for the study, owned by the State Stud Farm in Kętrzyn, was long enough (13 years on average) to ensure a representative gene pool of sons and daughters. They were selected based on the analysis of stud-book records so that the place of their stationing was consistent with copulating centers that have been using stallion Rolltan.

The experimental material was collected using databases owned by the Provincial Union of Horse Breeders in Białystok (WZHK), Central Equidae Register of the Polish Association of Horse Breeders, as well as books and works concerning the development of horse breeding available at specialist websites. Analytical data originated from: studbooks, stallion records, stallion listings and stallion catalogs from auctions of cold-blooded horses.

In-depth analysis concerned population numbers, biometric parameters (including withers height, chest circumference and cannon circumference), bonitation scores and coat color structure of the analyzed males and females. Analyses included the offspring registered in the Studbook of the Polish Cold-Blooded Horse: Main Studbook – for stallions as well as Studbook and Main Studbook – for mares [Księgi stadne. . . , <http://baza.pzhk.pl/>].

Results achieved in measurements of zoometric parameters of the analyzed horses were subjected to a statistical analysis by computing mean values and standard deviations. Significance of differences in the mean values of biometric parameters was determined between the offspring of the analyzed stallions using one-way analysis of variance, whereas multiple comparisons were made with the Duncan's test in Statistica ver. 10.0 computer package (StatSoft).

RESULTS AND DISCUSSION

Stallion Rolltan was a highly desirable studhorse by the breeders, which is indicated by the long total time of its breeding use – 18 breeding seasons at 20 copulation centers (Table 1).

Table 1. Characteristics of breeding use and number of the offspring chosen for the analysis

Tabela 1. Charakterystyka użytkowania rozplodowego oraz liczba potomstwa poddanego analizie

Stallion's name Nazwa ogiera	Total length of breeding use, years Długość użytkowania rozplodowego, lata	Number of covered mares Liczba pokrytych klaczy	Number of offspring subjected to analysis Liczba potomstwa poddanego analizie	
			stallions ogierey	mares klacze
Rolltan	18	540	63	67
Bilet	15	340	7	25
Brązowy	12	412	5	14
Brydź	14	434	7	22
Butler	12	514	35	49
Marabut	12	705	5	9
Salniak	12	598	12	18
Sektor	12	388	44	43
Senior	13	523	31	36
Sondaż	13	467	3	32

In the case of the remaining stallions selected for the study, their average time at breeding centers was 12.7 seasons, which indicates that they were also fertile for a long time and produced offspring desirable by breeders. It is commonly believed that a short time of breeding use and a high number of studhorses introduced to reproduction are disadvantageous, because it is likely that they will be eliminated from breeding with their reproductive potential remained unexploited [Brzeski and Mozdyniewicz 1974, Jastrzębska and Tomczyński 2003]. The anxiety over the advanced age of reproducers used in breeding is, however, groundless when a stallion is appropriately exploited and under appropriate care [Zwoleński 1983, Davies Morel and Gunnarsson 2000].

The number of mares covered by the analyzed studhorses was significant and ranged from 340 (stallion Bilet) to 705 (stallion Marabut), however none of the analyzed stallions left so numerous offspring registered in the Studbooks of the Polish cold-blooded horse as stallion Rolltan did (in total 130 individuals).

One of the most important evaluation criteria of stallions qualified for reproduction include their biometric parameters, the minimum values of which are stipulated in the Breeding Program of Polish Cold-Blooded Horse. Apart from determining the caliber of a horse and its body proportions, zoometric parameters have also a direct impact on the quality of a given individual assessment. A comparison of results achieved for the male offspring of stallion Rolltan and selected stallions of the Polish cold-blooded horse revealed a relatively great discrepancy in values of the analyzed parameters (Table 2).

Table 2. Values of biometric parameters in sons of Rolltan and of selected stallions of Polish cold-blooded horse

Tabela 2. Wartości parametrów biometrycznych synów ogiera Rolltan i wybranych ogierów rasy polski koń zimnokrwisty

Stallion's name Nazwa ogiera	Number of sons Liczba synów	Biometric parameters, cm Parametry biometryczne, cm					
		withers height wysokość w kłębie		chest circumference obwód klatki piersiowej		cannon circumference obwód nadpęcia	
		\bar{x}	s	\bar{x}	s	\bar{x}	s
Rolltan	63	159.6 ^{abA}	4.02	224.7	11.22	27.6	1.71
Bilet	7	160.7 ^{abAB}	3.41	220.7	3.45	27.2	1.15
Brązowy	5	158.2 ^{abAB}	4.66	219.6	8.56	27.3	1.20
Brydź	7	158.0 ^{abA}	2.16	218.0	9.38	27.6	1.49
Butler	35	161.2 ^{aA}	3.63	220.5	8.41	27.8	1.00
Marabut	5	156.6 ^{dC}	1.52	217.8	4.66	25.2	1.44
Salniak	12	159.3 ^{bcdABC}	2.50	226.6	6.49	26.2	1.01
Sektor	44	160.3 ^{abAB}	3.38	225.4	8.20	27.4	1.00
Senior	31	159.3 ^{abcABC}	3.90	221.2	8.34	26.9	1.28
Sondaż	3	158.3 ^{cdBC}	4.04	217.7	15.04	25.7	0.76
Total number of selected stallions Wybrane ogiery ogółem		159.9	3.57	222.3	8.39	27.2	1.25

AaBb – means in the column marked by other letters differ significantly, small letters at the level of $P \leq 0.05$, capital letter at the level of $P \leq 0.01$.

AaBb – wartości w kolumnach oznaczone różnymi literami różnią się statystycznie, małe litery oznaczają istotność na poziomie $P \leq 0,05$, duże litery $P \leq 0,01$.

The greatest, highly statistical difference in withers height, i.e. 4.6 cm, was noted between the offspring of Butler and Marabut stallions. Sons of Rolltan were characterized by withers height of 159.6 cm on average. Comparing this value with the mean value reported for the other stallions (159.9 cm), it may be noticed that the offspring of the Swedish stallion was negligibly shorter. Values of this parameter achieved by the offspring of both stallion Rolltan and the other selected stallions were, however, higher than these reported by Wilczak [1998] in the summary of auctions of 2.5-year-old stallions in 1997, i.e. 156.6 cm on average. In turn, Bobowski et al. [2005], who analyzed cold-blooded studhorses presented at the auctions held in 2004 in the Podlaskie Province, determined the average withers height at 158.1 cm. When describing auctions of stallions held in Poland in 2010, Ganowicz et al. [2011] stated that the mean withers height of stallions qualified for breeding was at 161.3 cm. The phenomenon of a successive increase in the withers height of young qualified stallions has already been observed and described by Karpeta et al. [2004].

In the group of the sons of stallion Rolltan, the mean chest circumference was at 224.7 cm (Table 2), whereas in the group of sons of the selected Polish cold-

blooded studhorses the respective value accounted for 222.3 cm. The value of this zoometric parameter in both sons of Stallion Rolltan and these of selected studhorses was desirable, as it indicates chest depth as well as size and volume of lungs [Zwoliński 1983, Kowalska 2007]. Also values of this parameter, significant from the practical point of view, were observed to increase over the last few decades in the breeding of the Polish cold-blooded horse. Chachuła et al. [1985] reported the average chest circumference of cold-blooded stallions analyzed in 1984 to reach 212.0. Both Chodkowski [1985] who analyzed studhorses renowned in breeding in the years 1977–1983 at the area of State Stud Farm in Olsztyn (OZHK) and Niewiński et al. [2004] who described auctions of cold-blooded stallions held in 2003, reported a lower mean value of chest circumference (218.0 cm) compared to that computed in our study. Even lower than the aforementioned chest circumference was observed by Jończyk [2008], who described Rhenish-German cold-blooded horses qualified for breeding in Germany (215.0 cm). In turn, a similar value (220.2 cm) to that achieved in our study was described by Niewiński [2010] in the summary of auctions held in 2009.

The mean cannon circumference in the group of male offspring of stallion Rolltan reached 27.6 cm (Table 2), whereas in the sons of the selected Polish stallions – 27.2 cm, which yielded a difference of 0.4 cm. It points to heavier build of the offspring of the imported stallion. This was also demonstrated by Hroboni [1969] who described auctions of stallions as early as in 1968. There are both pros and cons of a large cannon circumference. On the one hand, it is desirable as it ensures a high stability to a horse which minimizes the risk of injuries. A cannon thicker than 27 cm, however, eliminates some cold-blooded horses from breeding, especially the Sokolski type horses [Program... 2014]. In addition, horses with a thick cannon and lymphatic constitution are more predisposed to mud fever [Kondratiuk 2012].

When reporting on the condition of cold-blooded horses in Poland, Pikula et al. [1999] stated that cannon circumference of 2.5-year-old stallions increased from 25.5 cm in 1993 to 26.1 cm in 1997. In turn, Budzyński et al. [2005] who analyzed stallions presented at auctions held in 2005 reported their mean cannon circumference at 27.3 cm.

Valuation of horses conducted based on a point scale called bonitation score is a subjective tool. During evaluation of conformation and movement, the highest number of sons of Rolltan ($n = 13$) achieved 80 bonitation points, which constituted 20.6% of the studied group of its offspring. This value was comparable with the mean quality of cold-blooded horses presented at auctions of 2.5-year-old stallions in the entire Poland in 2009 [Niewiński 2010]. A similar number of sons, i.e. $n = 12$ (19.1%) achieved 81 bonitation points. The lowest valuation accounting for 77 points was achieved by one son (1.6% of the analyzed group). It is noteworthy

thy that as many as 21 stallions achieved 82 and more points, which represented 33.3% of the analyzed male offspring of stallion Rolltan (Table 3).

Table 3. Number of male offspring of Rolltan and of selected stallions of Polish cold-blooded horse with regard to the bonitation score

Tabela 3. Liczba potomstwa męskiego ogiera Rolltan i wybranych reproduktorów rasy polski koń zimnokrwisty z uwzględnieniem ich oceny bonitacyjnej

Number of bonitation scores Liczba punktów bonitacyjnych	Offspring of Rolltan Potomstwo ogiera Rolltan		Offspring of selected stallions of Polish cold-blooded horse Potomstwo wybranych ogierów rasy polski koń zimnokrwisty	
	number of horses liczba koni	percentage % udział	number of horses liczba koni	percentage % udział
≤77	1	1.6	7	4.7
78	8	12.7	18	12.1
79	8	12.7	19	12.7
80	13	20.6	35	23.5
81	12	19.1	35	23.5
82	7	11.1	17	11.4
83	9	14.3	15	10.0
84	5	7.9	1	0.7
85	0	0.0	1	0.7
86	0	0.0	1	0.7
Average number of bonitation score Średnia liczba punktów bonitacyjnych	80.7		80.4	

The highest number of sons ($n = 70$) of the selected Polish cold-blooded stallions were characterized by bonitation score of 80 and 81 points, which constituted 47.0% of stallions of this group (Table 3). A high number of studhorses ($n = 44$) achieved a bonitation score of 79 points or lower, which represented 29.5% of this group of horses. In turn, a bonitation score reaching 82 points and more was found in 35 stallions (23.5% of the analyzed group). The conducted analysis demonstrated that the mean bonitation score of stallions originating after stallion Rolltan (80.7 points) was by 0.3 point higher than in the male offspring of the selected Polish cold-blooded stallions (80.4 points).

In analyzing cold-blooded stallions exploited in the State Stud in Kętrzyn in the years 1970–2000, Jastrzębska [2002] achieved the bonitation score of this horses at 80.5 points in 2000, which was indicative of the improvement in their conformation and movement by 0.3 points compared to the initial year of 1970. In turn, Wilczak [1998] described auctions of cold-blooded stallions held in 1997 and reported the bonitation score of qualified stallions at 79.6 points. In a study conducted by Kowalska [2007], stallions used for breeding at the area of the Warmia

and Mazury Association of Horse Breeders in 2005 were characterized by bonitation score ranging from 80 to 82 points, which constituted barely 3% of the studied population. In turn, according to Niewiński et al. [2008], who described auctions of stallions held in 2007, the mean bonitation accounted for 79.6 points. A comparative analysis of the aforementioned studies indicates that the analyzed offspring of stallion Rolltan was characterized by the best quality expressed by the bonitation score, which indicates a very good quality of the offspring produced from these matings.

Furthermore, 6 and 8 types of coat color were found to occur in the population of the sons of stallion Rolltan and in these of selected Polish cold-blooded stallions (Fig. 1). The predominating coat colors in the group of male offspring of Rolltan were chestnut (64.1%) and bay (20.3%), whereas in the group of sons of the Polish cold-blooded stallions the respective values were at 55.0% and 22.8%. Preponderance of the above-mentioned coat colors was earlier observed by other authors [Chachuła et al. 1985, Budzyński et al. 1994, Harbaczevska 2008].

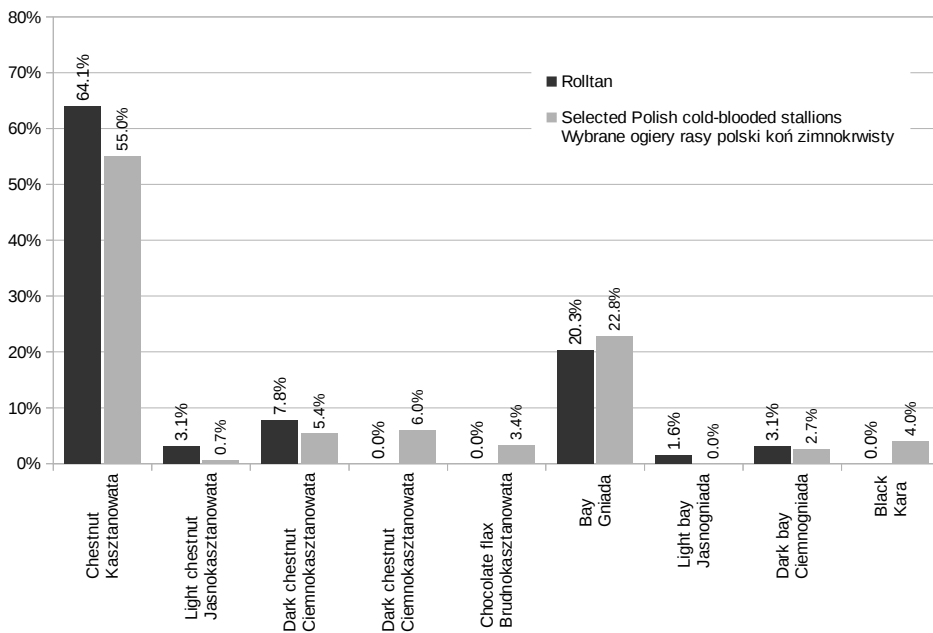


Fig. 1. Structure of coat color in male offspring of Rolltan and of selected stallions of Polish cold-blooded horse

Rys. 1. Struktura umaszczenia potomstwa męskiego pochodzącego po ogierze Rolltan i wybranych ogierach rasy polski koń zimnokrwisty

The mean withers height of daughters of stallion Rolltan accounted for 157.5 cm, whereas that of mares after the selected Polish cold-blooded stallions for

157.4 cm (Table 4). The difference between groups was small and reached only 0.1 cm. The differences recorded between particular groups of mares originating after individual stallions were, however, greater and statistically significant (Table 4).

Table 4. Values of biometric parameters in daughters of Rolltan and of selected stallions of Polish cold-blooded horse

Tabela 4. Wartości parametrów biometrycznych córek ogiera Rolltan i wybranych ogierów rasy polski koń zimnokrwisty

Stallion's name Nazwa Ogiera	Number of daughters Liczba córek	Biometric parameters, cm Parametry biometryczne, cm					
		withers height wysokość w kłębie		chest circumference obwód klatki piersiowej		cannon circumference obwód nadpęcia	
		\bar{x}	s	\bar{x}	s	\bar{x}	s
Rolltan	67	157.5 ^{bedBC}	4.11	218.1 ^{cAB}	12.32	25.4 ^{bedAB}	1.47
Bilet	25	158.5 ^{edBC}	4.16	217.4 ^{bcAB}	10.09	25.2 ^{abcdAB}	1.05
Brażowy	14	156.2 ^{bcBC}	2.76	210.8 ^{abA}	8.76	25.0 ^{abcAB}	0.59
Brydź	22	157.6 ^{bedBC}	4.42	217.1 ^{bcAB}	8.32	25.8 ^{dB}	1.23
Butler	49	157.7 ^{bedBC}	3.28	216.2 ^{bcAB}	9.59	25.1 ^{abcdAB}	1.00
Marabut	9	153.1 ^{aA}	2.76	209.7 ^{aA}	7.81	24.6 ^{aA}	0.58
Salniak	18	155.5 ^{bAB}	4.09	211.4 ^{abAB}	9.88	24.9 ^{abAB}	1.36
Sektor	43	159.2 ^{dC}	4.29	220.0 ^{cB}	9.89	25.7 ^{cdB}	1.35
Senior	36	156.8 ^{bedBC}	3.65	216.4 ^{bcAB}	7.70	24.6 ^{abA}	0.97
Sondaż	32	156.9 ^{bedBC}	3.06	214.6 ^{abcAB}	10.09	24.9 ^{abcAB}	0.94
Total numbers of selected stallions		157.4	3.91	216.0	9.60	25.2	1.14
Wybrane ogiery ogółem							

AaBb – means in the column marked by other letters differ significantly, small letters at the level of $P \leq 0.05$, capital letter at the level of $P \leq 0.01$.

AaBb – wartości w kolumnach oznaczone różnymi literami różnią się statystycznie, małe litery oznaczają istotność na poziomie $P \leq 0,05$, duże litery $P \leq 0,01$.

A comparison of withers height of mares analyzed in this study with respective values noted for individuals characterized in the last few decades by other authors [Chachuła 1985, Jastrzębska and Kowalska 2007, Jastrzębska et al. 2010] revealed similar correlations as in the group of male offspring.

The greatest statistically significant mean chest circumference was determined in mares after stallion Sektor (220.0 cm), followed by daughters of stallion Rolltan (218.1 cm) and Bilet (217.4 cm), whereas the smallest in mares after stallion Marabut (209.7 cm) (Table 4). The mean chest circumference of all mares after the selected Polish cold-blooded stallions was at 216.0 cm, whereas the mean difference noted compared to daughters of stallion Rolltan reached 2.1 cm.

Chachuła and Rudowski [1967], who analyzed mares at the Horse Stud Nowe Jankowice used in 1965, reported their mean chest circumference at 208.0 cm. A negligibly higher result, i.e. 208.4 cm, was achieved by Pikuła et al. [1999] for

mares listed in volume V of the Cold-Blooded Horse Studbook (covering the years between 1984 and 1992). In turn, Jastrzębska and Bruski [2010] who conducted investigations at the area of the Pomeranian Association of Horse Breeders, stated that the average value of this parameter in this region reached 216.5 cm.

In the analyzed group of daughters after stallion Rolltan, the mean cannon circumference accounted for 25.4 cm, whereas in the female offspring after the selected Polish cold-blooded stallions for 25.2 cm (Table 4). The difference between groups was small and lesser than in the group of male offspring (Table 2). However, it indicates a slightly heavier build of daughters of Rolltan, i.e. improvement in this trait among horses being the offspring of Arden studhorses. Such a dependency has already been reported first by Hroboni [1969] and then by other authors [Wilczak 1989, Budzyński et al. 1995, Jastrzębska 2009, Niewiński 2012].

The study conducted by Chachuła et al. [1985] demonstrated that a high number of mares had cannon circumference ranging from 22.0 to 24.5 cm (73.7% of the analyzed population), with the mean value accounting for 22.4 cm. In turn, based on investigations carried out by Karpeta and Tomczyński [1999], it may be concluded that the average values of cannon circumference of the Polish cold-blooded horses tended to progress throughout the analyzed time span between 1984 and 1996.

Considering values of cannon circumference in the female offspring, the highest value of this parameter, that was statistically highly significant, was found in daughters of stallions: Brydź (25.8 cm), Sektor (25.7 cm) and Rolltan (25.4 cm). A slightly lower value was observed in mares after stallions Bilet (25.2 cm) and Butler (25.1 cm), whereas the lowest one in daughters after Marabut and Senior (24.6 cm) (Table 4).

The highest number of mares ($n = 16$) after stallion Rolltan were characterized by bonitation score of 78 points, which constituted 23.9% of the analyzed population. A slightly lower number of mares ($n = 15$, 22.4%) were scored 79 points (Table 5) In turn, the score of 80 points and more was reported for as many as 26 mares. In the group of daughters after the selected Polish cold-blooded stallions, 56 mares had a bonitation score of 78 points, which constituted 22.6% of the analyzed group, whereas a slightly lower number of mares ($n = 47$, 19.0%) were scored 79 points. A very high number of mares ($n = 69$) achieved the score of 77 points or lower and this group constituted 27.8% of the analyzed population. The lowest number of female offspring achieved the highest bonitation scores (83 points and 85 points).

The mean bonitation scores were at 78.9 points and 78.4 points for daughters of, respectively, stallion Rolltan and selected Polish cold-blooded stallions. Considering that production of the high-quality mares is a measure of the breeding advance and one of the most difficult tasks in breeding practice [Krasowska

and Świgoń 2001], good quality of daughters after stallion Rolltan indicates the appropriate breeding strategy.

According to Karpeta [1998], the mean valuation of mare exterior expressed by the bonitation score in the years 1984-1996 ranged from 76.05 \pm 1.25 points in 1984 to 76.55 \pm 0.45 points in 1996. A significantly lower mean bonitation was observed by Zięcik [1985] who analyzed cold-blooded mares at the area of Elbląskie Province (76.7 points) and Gdańskie Province (75.1 points), which indicates a poorer quality of the reproductive material in those years.

Our study revealed 7 types of coat color in the mares after stallion Rolltan (Fig. 2). Likewise in the group of male offspring – sons of Rolltan, the predominating coat colors in mares were chestnut (59.7% of the population) and bay (19.4%). Daughters of the selected Polish cold-blooded stallions were characterized by 11 types of coat color. The highest number of mares were chestnut (51.2%), bay (20.2%), dark-chestnut (6.0%) and black (4.4%).

Dark coat colors are highly desirable by breeders, hence their high contribution in the analyzed population of mares. According to Zwoliński [1983], horses with dark coat color are healthier and more immune, easier to care for, as well as better tolerate effects of long exposure to sun [Bruski 2009]. A growing interest

Table 5. Number of female offspring of Rolltan and of selected stallions of Polish cold-blooded horse with regard to the bonitation score

Tabela 5. Liczba potomstwa żeńskiego ogiera Rolltan i wybranych reproduktorów rasy polski koń zimnokrwisty z uwzględnieniem ich oceny bonitacyjnej

Number of bonitation scores Liczba punktów bonitacyjnych	Offspring of Rolltan Potomstwo ogiera Rolltan		Offspring of selected stallions of Polish cold-blooded horse Potomstwo wybranych ogierów rasy polski koń zimnokrwisty	
	number of horses liczba koni	percentage % udział	number of horses liczba koni	percentage % udział
≤77	10	14.9	69	27.8
78	16	23.9	56	22.6
79	15	22.4	47	19.0
80	11	16.4	42	16.9
81	10	14.9	24	9.7
82	3	4.5	8	3.2
83	1	1.5	1	0.4
84	0	0.0	0	0.0
85	1	1.5	1	0.4
86	0	0.0	0	0.0
Average number of bonitation score Średnia liczba punktów bonitacyjnych	78.9		78.4	

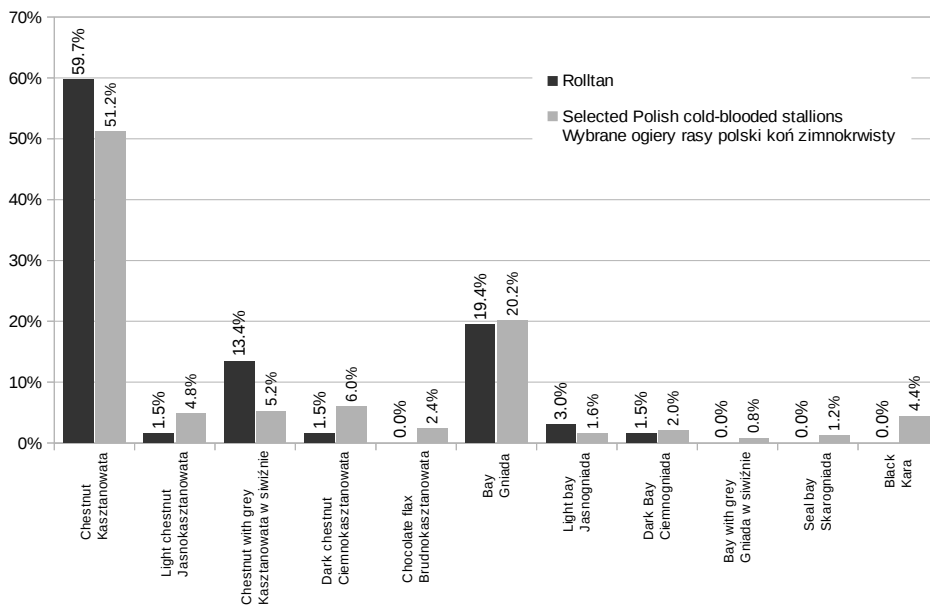


Fig. 2. Coat color structure in female offspring of Rolltan and of selected stallions of Polish cold-blooded horse

Rys. 2. Struktura umaszczenia potomstwa żeńskiego pochodzącego po ogierze Rolltan i wybranych ogierach rasy polski koń zimnokrwisty

has recently been observed among breeders in black horses, hence their contribution in the populations of Polish cold-blooded horses increases [Jastrzębska 2002, Harbaczewska 2008].

CONCLUSIONS

The analysis of the population of offspring after stallion Rolltan and after selected Polish cold-blooded stallions enabled concluding that the time of imported Swedish Arden stallion use in breeding was significantly longer compared to the other studhorses analyzed in the study.

Exterior analysis revealed higher mean values of the following zoometric parameters: chest circumference by 2.4 cm and cannon circumference by 0.4 cm in sons of stallion Rolltan as well as higher mean values of the following parameters: withers height by 0.1 cm, chest circumference by 2.1 cm and cannon circumference by 0.2 cm in Rolltan daughters compared to the offspring of the selected Polish cold-blooded stallions.

The higher bonitation scores of Rolltan sons and daughters (by 0.3 points and 0.5 points, respectively) indicates that they had better conformation and movement than the offspring of selected stallions of Polish cold-blooded horses.

In the group of the analyzed offspring of stallion Rolltan and selected stallions of the Polish cold-blooded horse analyses demonstrated the occurrence of different coat colors specific to cold-blooded horses, mainly chestnut and bay.

In summary, it may be concluded that the offspring of stallion Rolltan achieved better results in terms of biometric parameters and bonitation score than the sons and daughters of the selected stallions of the Polish cold-blooded horse.

Results of the study, years of experience of the authors of the present study and the views of people associated with the horse breeding practice enable concluding that the breeding of Polish cold-blooded horses should be supplied with imported Swedish Arden stallions of good quality. These horses are characterized by excellent capability of adapting to climatic and feeding conditions occurring in Poland as well as contribute to the improvement of offspring quality, which is expressed by their higher bonitation score. Considering the above, import of stallions of West-European breeds should be continued, however breeding progress in the population of the Polish cold-blooded horses may only be achieved with the best stallions that would be reliably evaluated in terms of the desirable traits during their qualification for breeding.

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WPŁYW IMPORTOWANEGO OGIERA, ARDENA SZWEDZKIEGO ROLLTAN, NA JAKOŚĆ POGŁOWIA KONI ZIMNOKRWISTYCH W POLSCE

Streszczenie. Populacja polskich koni zimnokrwistych została wytworzona na bazie rodzimego materiału żeńskiego przy użyciu zachodnioeuropejskich reproduktorów. W pracy dokonano oceny wpływu importowanych ogierów ras zimnokrwistych na pogłowie koni w Polsce na przykładzie cennego ardena szwedzkiego Rolltan. Badaniami objęto potomstwo ogiera Rolltan, rasy arden szwedzki, w liczbie 63 ogierów oraz 67 klaczy, urodzonych na terenie Polski w latach 1989–2006. W celach porównawczych do analizy włączono także potomstwo 9 wybranych rozplodników rasy polski koń zimnokrwisty, w liczbie 149 potomstwa płci męskiej i 248 żeńskiej. Badania eksterieru wykazały wyższe średnie wartości wymiarów (obwodu klatki piersiowej o 2,4 cm, obwodu nadpęcia o 0,4 cm) synów ogiera Rolltan oraz wyższe średnie wartości (wysokości w kłębie o 0,1 cm, obwodu klatki piersiowej o 2,1 cm, obwodu nadpęcia o 0,2 cm) jego córek, niż potomstwo wybranych ogierów rasy polski koń zimnokrwisty. Wyższa bonitacja synów Rolltan o 0,3 pkt. i córek o 0,5 pkt. świadczy o bardziej poprawnej budowie i lepszym ruchu tych osobników niż potomków wybranych reproduktorów rasy rodzimej. Podczas badań wykazano, iż najwięcej koni charakteryzowało się maścią kasztanową oraz gniadą. Uzyskane wyniki badań, wieloletnie doświadczenie autorów niniejszej pracy oraz opinie osób związanych z praktyką hodowlaną upoważniają do postawienia wniosku, iż polska hodowla koni zimnokrwistych powinna być zasilana bardzo dobrej jakości importowanymi ogierami rasy arden szwedzki.

Słowa kluczowe: konie zimnokrwiste, importowane ogiery, parametry zoometryczne, bonitacja

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