

COMPARISON OF THE EXTERIOR PARAMETERS AND BREED STRUCTURE OF ANCESTORS OF THE POLISH NOBLE HALF-BRED AND THE CZECH WARM-BLOOD STALLIONS

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Abstract. The analysis included 399 Polish Noble Half-bred stallions registered in Vol. 2 of the Studbook of the Polish Noble Half-bred horses (PKSP) and 75 Czech Warm-blood stallions registered in the Studbook of the Czech Warm-blood horses (Kčt). No significant differences were found in mean exterior measurements between the Polish Noble Half-bred and the Czech Warm-blood stallions. In both studbooks, the dominant sire breeds are local breed getters, i.e. the Wielkopolski and the Polish Noble Half-bred stallions in the PKSP studbook and the Czech Warm-blood ones in the Kčt studbook. Similar situation is being observed when analysing the ancestry pedigree of their dams; in both breeds, local breed mares were most frequently selected as female breeding material.

Key words: Czech Warm-blood, Polish Noble Half-bred, stallions

INTRODUCTION

Development of the horse riding, which has been observed in Europe in last decades, results in demand for horses with endurance predispositions. The breeding work, carried out in Western European countries for a number of years, has led to the attainment of horse breeds with verified sport performance, such as Holstein horse, Hanoverian horse, KWPN horse or Selle Francais horse. These are the horses which have been successful in the sport arena for years and therefore getters of these breeds are willingly employed for mating aimed at the formation of new horse breeds being useful in horse riding as well as horse recreation. An example of such breeds is the Polish Noble Half-bred horse or the Czech Warm-blood horse (český teplokrevník).

The aim of this study was to analyse biometrically the stallions and the breed structure of sires and dams of the Polish Noble Half-bred stallions (sp) registered in Vol. 2 of the

Studbook of the Polish Noble Half-bred horses (PKSP) and the Czech Warm-blood stallions (čt) registered in the Studbook of the Czech Warm-blood horses (Kčt).

MATERIAL AND METHODS

The analysis included 399 Polish Noble Half-bred stallions registered in Vol. 2 of the Studbook of the Polish Noble Half-bred horses (PKSP) and 75 Czech Warm-blood stallions registered in the Studbook of the Czech Warm-blood horses (Kčt). Other stallions registered in the aforesaid stud books (imported to Poland and the Czech Republic from another country) have not been considered. For the examined stallion groups, a percentage breed structure of their sires and dams was determined, as well as mean exterior measurements according to sire and dam breeds. Biometric analysis referred to three exterior measurements, i.e. withers height (cm), chest circumference (cm) and cannon circumference (cm). In the analysis of mean exterior parameters for stallions of both examined breeds according to the sire breed, only these groups were considered which number over 5 animals.

The following abbreviations for horse breed names were used in tables: sp – Polish Noble Half-bred, ct – Czech Warm-blood, wlkp – Wielkopolski horse, han – Hanoverian horse, KWPN – Dutch Warm-blood, m – Małopolski horse, hol – Holstein horse, xx – English Thoroughbred, BWP – Belgian Warm-blood, sf – Selle Francais, old – Oldenburg horse, baw – Bavarian horse, Z – Zangersheide horse, westf – Westfalian horse, thur – Thuringer Warm-blood, x – English Half-blood, trk – Trakehnen horse, and Zweibr. – Zweibrucker horse.

The findings were subject to statistical analysis using Statistica® 8.0 computer software package.

RESULTS AND DISCUSSION

Mean exterior measurements for the Polish Noble Half-bred stallions and the Czech Warm-blood ones are presented in Table 1. As can be seen from it, mean values for withers height, chest circumference and cannon circumference for stallions of both breeds were very similar and did not differ significantly. Large differences in maximum and minimum values for three measurements show that both breeds, i.e. the sp and the ct, are still little consolidated genetically; in this connection, exterior properties traits are being inherited less decisively [Kaproń 1999]. The obtained results are similar to mean measurements for stallions registered in Vol. 1 of the Polish Noble Half-bred Studbook (Ksp), being respectively 166.93–194.54–22.20 cm [Janiszewska et al. 2004], as well as to those for all Polish Noble Half-bred stallions registered in Vol. 1 and Vol. 2 of the Polish Noble Half-bred Studbook (Ksp), i.e. 165.8–192.9–21.9 cm [Kubacki et al. 2006]. The mean value of boniness index determined for the Polish Noble Half-bred [sp] stallions registered in Vol. 2 of the Polish Noble Half-bred Studbook (Ksp) slightly decreased when compared to that of

the stallions registered in Vol. 1 of the Ksp studbook [Janiszewska et al. 2004], i.e. from 13.30 to 13.09%, which is a result of directing the breeding of noble half-bred horses towards saddle horse type but, on the other hand, a tendency towards reduction of this index should be under control so that its value will not decrease too much.

Table 1. Mean values of basic measurements of Polish Noble Half-bred and Czech Warm-blood stallions, cm

Tabela 1. Średnie wartości podstawowych wymiarów ogierów ras sp i ct, cm

Stud book Księga stadna	Stallions number, n Liczba ogierów, n	Height at withers Wysokość w kłębie				Chest circumference Obwód klatki piersiowej				Cannon circumference Obwód nadpęcia			
		x	min	max	S	x	min	max	S	x	min	max	S
PKSP	399	166.6	157.0	177.0	3.4	192.1	179.0	206.0	5.4	21.8	19.5	23.5	0.7
CT	75	166.1	161.0	178.0	3.3	192.5	180.0	206.0	5.3	21.7	20.0	24.0	0.7

x – mean – średnia; min – minimum – minimum; max – maximum – maksimum; S – standard deviation – odchylenie standardowe.

Tables 2 and 3 are illustrating the breed structure of stallions of both analysed breeds. As can be seen from Table 2, the Polish and the Czech half-bred stallions registered in present-day stud books were sired by getters of several dozen breeds provided for in the breeding programmes for these breeds. The largest number of the sp stallions registered in Vol. 2 of the Ksp studbook had the Wielkopolski and the Polish Noble Half-bred sires (over 40% in total). On the other hand, the largest number among the Czech stallions was sired by the same breed (čt) (29.4%). Hanoverian stallions sired 13% of the sp stallions and 17.3% of the čt ones, whereas Holstein stallions were more frequently used in the breeding of the čt horses (14.7% čt stallions sired by getters of the same breed) than in that of the sp ones (9.5%). When analysing the sport performance of the Czech Warm-blood horses in 1984–1994 according to their ancestry pedigree, Hanoverian breed predominance in pedigree was found to have a positive effect on the results being obtained in show jumping competition, whereas that of Trakehnen breed on dressage competition results [Jiskrova and Misar 1997]. The Małopolski and the KWPN horses sired the Polish Noble Half-bred stallions at the same level as Holstein stallions (9.8% and 10.8%, respectively). Stallions of remarkably riding breeds, most often those coming from German and Dutch breeding, had the most crucial effect on the improvement of riding traits in noble half-bred horses from the Poznań studs [Nowicka-Posłuszna and Hanke 1997]. On the other hand, the Czech stallions were sired by English Half-blood getters more frequently (9.3%) than by the KWPN ones (6.7% – not illustrated in table). Thoroughbred stallions sired over 6% of the sp population examined, whereas Belgian Warm-blood, Selle Francais, Oldenburg and Bavarian horses, among others, are among breeds which sired less than 2% of it.

Some of these breeds were more frequently used in the breeding of the *čt* stallions, i.e. over 5% of this population is sired by Bavarian stallions, 4% by Selle Francais and German saddle horses, each, and 1.3% of it by the Wielkopolski stallions (not illustrated in table). As can be seen from table 3, the breed structure of dams of the Polish and the Czech stallions is definitely less complex. Over a half of dams of the *sp* stallions from Vol. 2 of the *Ksp* are the Wielkopolski mares, whereas 22.6% and 17.7% are respectively the Polish Noble Half-bred and the Małopolski mares. On the other hand, 82.7% of *čt* stallions are dammed by mares of the same breed (Czech Warm-blood). Thus, as it results from table, local horses of the Wielkopolski breed still play a key role in the improvement of the Polish Noble Half-bred, in particular dam-mares adequately selected from the point of view of their sports capabilities are valuable breeding material. However, an upward trend observed in the number of the *sp* breeding mares in regional horse breeders associations in the last decade [Janiszewska et al. 2005, Ignor et al. 2007] suggests that the breed structure of dam component for the Polish Noble Half-bred stallions will change. The breeding of the Czech Warm-blood horses is mainly based on a herd of mares from own half-bred breed, i.e. the *čt* horse. In both populations under discussion, the effect of foreign breeds is first of all visible through the use of adequately selected getters from breeds with confirmed utility value.

Table 2. Mean values of basic measurements of Polish Noble Half-bred and Czech Warm-blood stallions according to father's breed, cm

Tabela 2. Średnie wymiary ogierów *sp* i *ct* w zależności od rasy ojca, cm

Father's breed Rasa ojca	Stallions number, n/% Liczba ogierów, n/%	Height at withers Wysokość w kłębie				Chest circumference Obwód klatki piersiowej				Cannon circumference Obwód nadpęcia			
		x	min	max	S	x	min	max	S	x	min	max	S
Polish Noble Hhalf-bred Stud book – Księga stadna PKSP													
wlqp	91/22.8	165.8	160.0	177.0	3.1	192.3	180.0	205.0	5.2	21.8	20.0	23.5	0.8
sp	82/20.6	166.9	160.0	175.0	3.3	192.1	179.0	203.0	6.0	21.8	20.0	23.5	0.8
han	52/13.0	167.8	162.0	175.0	3.1	192.8	184.0	203.0	4.7	22.0 ^a	20.5	23.5	0.6
KWPN	43/10.8	166.3	160.0	174.0	3.3	191.6	180.0	202.0	5.3	21.7	20.0	23.0	0.7
m	39/9.8	165.5	157.0	174.0	4.3	191.6	180.0	206.0	6.1	21.5	19.5	23.0	0.7
hol	38/9.5	167.9	158.0	174.0	3.4	191.7	180.0	202.0	4.9	21.7	20.0	23.0	0.8
xx	26/6.5	166.4	160.0	172.0	3.2	192.6	181.0	202.0	4.9	21.4	20.0	23.0	0.7
BWP	7/1.8	167.1	164.0	170.0	2.3	190.1	185.0	197.0	4.1	21.6	20.5	22.5	0.6
sf	7/1.8	166.7	162.0	170.0	3.0	189.1	180.0	201.0	6.8	21.2	20.0	22.0	0.7
Other – Inne	14/3.5	166.8	162.0	172.0	4.7	194.1	185.0	202.0	4.1	22.2	21.5	23.0	0.6
Total – Razem	399/100	166.6	3.4	157.0	177.0	192.1	5.4	179.0	206.0	21.8	0.7	19.5	23.5
Czech Warm-blood Stud book – Księga stadna CT													
ct	22/29.4	165.6	160.0	175.0	3.3	191.8	180.0	200.0	5.2	21.8	20.0	23.5	0.7
han	13/17.3	165.7	162.0	170.0	2.7	192.2	183.0	201.0	5.0	21.9	21.0	22.5	0.5
hol	11/14.7	168.2	162.0	178.0	4.4	192.9	181.0	204.0	6.7	21.8	20.5	24.0	1.0
xx	7/9.3	165.6	163.0	168.0	2.0	195.1	189.0	206.0	5.4	21.1 ^a	20.5	21.5	0.4
Other – Inne	22/29.3	166.0	162.0	175.0	3.9	192.2	182.0	195.0	5.2	21.7	20.0	23.0	0.8
Total – Razem	75/100	166.1	3.3	161.0	178.0	192.5	5.3	180.0	206.0	21.7	0.7	20.0	24.0

^a – within the particular columns the means differ significantly at $p \leq 0.05$.

^a – średnie w kolumnach różnią się istotnie przy $p \leq 0,05$.

When compared to stallions registered in Vol. 1 of the Ksp studbook, distinct changes can be observed in the breed structure of parents. From among 145 stallions from this studbook, 121 ones are characterised by pedigrees with 12.5 to 87.5% gene contribution of the Hanoverian breed [Janiszewska et al. 2004]. As reported by Łojek [2003], combinations of Hanoverian stallions with mares of different pedigree groups was the most numerous mating group in Vol. 1 of the Ksp, followed by stallions sired by getters of other foreign breeds (11%), while merely less than 4% of the sp stallions were sired by the Wielkopolski and the Małopolski getters. Thus, as can be seen, a decrease has occurred in recent years in using Hanoverian stallions in selection of the Polish Noble Half-bred horses in favour of those from local breeding. In case of the breed structure of dam-mares for the sp stallions registered in Vol. 1 of the Ksp studbook, Pomeranian mares prevailed (27.6%), followed by Hanoverian x local breed mares (over 17%) and the Małopolski ones (nearly 18%), and with almost 14% of the stallion stock being dammed by English Thoroughbred mares [Łojek and Nowak 2003], whereas merely 3.3% of the Polish Noble Half-bred stallions registered in Vol. 2 of the PKSP studbook was dammed by English Thoroughbred mares, with Pomeranian ones and those crossbred with Hanoverian horses being replaced by the Wielkopolski mares.

Table 3. Mean values of basic measurements of Polish Noble Half-bred and Czech Warm-blood stallions according to mother's breed, cm

Tabela 3. Średnie wymiary ogierów sp i ct w zależności od rasy matki, cm

Mother's breed Rasa matki	Stallions number, n/% Liczba ogierów, n/%	Height at withers Wysokość w kłębie				Chest circumference Obwód klatki piersiowej				Cannon circumference Obwód nadpęcia			
		x	S	min	max	x	S	min	max	x	S	min	max
Polish Noble Hhalf-bred Stud book – Księga Stadna PKSP													
m	71/17.7	165.9	3.6	159.0	177.0	191.3	5.8	180.0	202.0	21.5	0.8	20.0	23.5
sp	90/22.6	166.8	3.3	158.0	175.0	191.9	5.5	179.0	202.0	21.9 ^a	0.5	20.0	23.5
wlqp	216/54.1	166.9	3.3	157.0	177.0	192.6	5.2	180.0	206.0	21.8 ^b	0.7	19.5	23.5
xx	13/3.3	165.7	4.3	158.0	172.0	190.6	5.2	183.0	200.0	21.2 ^c	0.7	20.5	22.5
Other – Inne	9/2.3	166.7	3.6	160.0	171.0	192.1	3.2	186.0	195.0	21.4	0.8	20.5	22.5
Total – Razem	399/100	166.6	3.4	157.0	177.0	192.1	5.4	179.0	206.0	21.8	0.7	19.5	23.5
Czech Warm-blood Stud book – Księga Stadna CT													
ct	62/82.7	166.3	3.2	161.0	178.0	192.7	5.0	180.0	206.0	21.7 ^c	0.7	20.0	24.0
Other – Inne	13/17.3	165.3	3.5	162.0	175.0	191.2	6.4	181.0	204.0	21.3 ^{ab}	0.6	20.3	22.0
Total – Razem	75/100	166.1	3.3	161.0	178.0	192.5	5.3	180.0	206.0	21.7	0.7	20.0	24.0

a, b, c – within the particular columns the means differ significantly at $p \leq 0.05$.

a, b, c – średnie w kolumnach różnią się istotnie przy $p \leq 0,05$.

As can be seen from Table 2, where 9 sire breed groups were singled out for the Polish Noble Half-bred stallions, these sired by Holstein and Hanoverian getters proved to be the highest, while those sired by the Małopolski ones the smallest, with differences not being however confirmed statistically. Among the Czech stallions, with 4 sire breed groups

being singled out (Czech Warm-blood, Hanoverian horse, Holstein horse and English Thoroughbred), animals sired by Holstein getters also proved to be the highest, although differences were not confirmed statistically either. Only mean cannon circumference in the sp stallions sired by Hanoverian getters proved to be significantly larger ($p \leq 0.05$) from that determined for the *čt* stallions sired by English Thoroughbred getters. As reported by Kubacki et al. [2006], from among the sp stallions registered in both volumes of the Ksp studbook, the largest withers height is characteristic of stallions sired by Bavarian and KWPN getters (167.3 cm), BWP and the sp getters (167.1 cm), and Hanoverian, Holstein and English Thoroughbred ones (166.9 cm), whereas those sired by Silesian getters proved to be the smallest (158.3 cm).

When analysing mean measurements of the Polish Noble Half-bred and the Czech Warm-blood stallions according to the breed of their dams, no significant differences were found with respect to withers height and chest circumference. On the other hand, significant differences were stated in cannon circumference between the sp stallions dammed by English Thoroughbred mares and the *čt* ones dammed by the Czech Warm-blood mares as well as between the sp stallions dammed by the Polish Noble Half-bred and the Wielkopolski mares and the *čt* ones dammed by mares of other breeds (Table 3).

CONCLUSIONS

Summing up, it is possible to state that present-day populations of the Polish Noble Half-bred and the Czech Warm-blood breeding stallions are similar in respect of their exterior. Statistical differences occurred only in cannon circumference between the sp stallions sired by Hanoverian getters and the *čt* ones sired by English Thoroughbred getters as well as between stallions dammed by mares of these breeds. In both studbooks, the dominant sire breeds are local breed getters, i.e. the Wielkopolski and the Polish Noble Half-bred stallions in the Ksp studbook and the Czech Warm-blood ones in the K*čt* studbook. Foreign breed stallions with high utility values (Hanoverian, Holstein, KWPN and Selle Francais, among others) are rarely used in the breeding of both breeds under discussion. Similar situation is being observed when analysing the ancestry pedigree of their dams; in both breeds, local breed mares were most frequently selected as female breeding material.

REFERENCES

- Ignor J., Cieśla A., Bratkowska M., Tabiszewska I., 2007. Struktura rasowa klaczy wpisanych do ksiąg stadnych w Związku Hodowców Koni Ziemi Lubuskiej w latach 2000–2004 [The breeding structure of mares registered in stud books of Lubuskie Province Horse Breeders Association in 2000–2004]. *Mat. Konf. LXXII Zjazdu PTZ „Nadzieje i możliwości wykorzystania genetyki molekularnej w doskonaleniu zwierząt”*, Warszawa 11–14.IX.2007, 102 [in Polish].
- Janiszewska J., Cieśla A., Ignor J., Tabiszewska I., Szymańska A., 2005. Analiza zmian w strukturze rasowej koni zarodowych na terenie Zachodniopomorskiego Związku Hodowców Koni

- w latach 2000–2003 [The analysis of changes in racial structure of breeding horses within the operational area of Western-Pomeranian Horse Breeders Association in 2000–2003]. *Folia Univ. Agric. Stetin. Zootech.* (243) 47, 61–70 [in Polish].
- Janiszewska J., Cieśla A., Radowicz E., Tabiszewska I., 2004. Wpływ udziału krwi hanowerskiej na parametry pokrojowe koni szlachejnych półkrwi [Effect of share of Hanoverian blood on conformation parameters of Noble Half-bred horses]. *Folia Univ. Agric. Stetin. Zootech.* 235 (46), 27–32 [in Polish].
- Jiskrova I., Misar D., 1997. Studies on effects of some factors on the sports performance on the Czech warm-blood horse. *Zesz. Nauk. AR Szczecin*, 177, *Zootechnika* 35, 23–35.
- Kapron M., 1999. Metody doskonalenia koni [Methods of horses improvement]. WAR, Lublin [in Polish].
- Kubacki S., Bagińska K., Kubacki P., 2006. Charakterystyka biometryczna i bonitacyjna koni szlachejnych półkrwi w zależności od pochodzenia ze strony ojca [The biometrical and exterior characterization of the Polish Noble Halfbred horses in relation to the origin of horses derived from father's side]. *Rocz. Nauk. PTZ* 2 (2), 15–25 [in Polish].
- Łojek J., 2003. Analiza doboru w hodowli koni szlachejnych półkrwi na przykładzie zwierząt wpisanych do I tomu Księgi Stadnej [Analysis of selection methods in horse population registered in Vol. I of The Polish Warmblood Stud Book]. *Rocz. Nauk. Zoot. Suppl.* 18, 223–227 [in Polish].
- Łojek J., Nowak Z., 2003. Analiza składu rasowego koni hodowli krajowej wpisanych do I tomu Księgi koni szlachejnych półkrwi [Breeding structure of horses registered in vol. I of the Polish Warmblood stud book]. *Rocz. Nauk. Zootech. Suppl.* 18, 151–154 [in Polish].
- Nowicka-Posłuszna A., Hanke B., 1997. Charakterystyka biometryczna, hodowlana i ocena wartości użytkowej reproduktorów stacjonujących w SK Pępowo, Posadowo i Racot w latach 1945–1995. Doniesienie [Biometrical and breeding characteristic and estimate of performance traits of sire using in Pępowo, Posadowo and Racot studs beetwen years 1945–1995. Report]. *Zesz. Nauk. AR Szczecin, Zootechnika* 177 (35), 279–280 [in Polish].

PORÓWNANIE PARAMETRÓW POKROJOWYCH ORAZ STRUKTURY RASOWEJ PRZODKÓW OGIERÓW RASY POLSKI KOŃ SZLACHETNY PÓŁKRWI ORAZ CZESKI KOŃ GORĄCOKRWISTY

Streszczenie. Analizą objęto 399 ogierów rasy polski koń szlachejny półkrwi wpisanych do II tomu Ksp (PKSP) oraz 75 ogierów rasy czeski koń gorącokrwisty wpisanych do Księgi Stadnej CT (Kčt). Nie stwierdzono istotnego zróżnicowania średnich wymiarów ogierów ras polski koń szlachejny półkrwi i czeski koń gorącokrwisty. W obu księgach stadnych dominującymi rasami ojców są reproduktory ras rodzimych: w PKSP ogiery wielkopolskie i szlachejne półkrwi, w Kčt ogiery czeski koń gorącokrwisty. Podobne zjawisko obserwuje się analizując pochodzenie matek ogierów. W obu rasach na żeński materiał zarodowy wybierano najczęściej klacze ras rodzimych.

Słowa kluczowe: czeski koń gorącokrwisty, ogiery, polski koń szlachejny półkrwi

Accepted for print – Zaakceptowano do druku: 27.10.2009