

CONFORMATION ANALYSIS OF HORSES USED IN EQUINE-ASSISTED ACTIVITIES AT POLISH HIPPOThERAPEUTIC CENTERS

Jacek Łojek¹, Michał Pluta², Angelika Cieśla³,
Anna Domachowska², Natalia Przybyłowicz³, Anna Łojek¹

¹Warsaw University of Life Science – SGGW, Poland

²University of Life Science Lublin, Poland

³West Pomeranian University of Technology, Szczecin, Poland

Abstract. The objective of the research was to determine the basic conformation traits of horses of different breeds performing hippotherapeutic service at chosen equine therapy centers. The research material included a total of 47 horses from 9 centers: Warsaw (7 horses), Bydgoszcz (6), Lublin and the region (13), Cracow and the region (9), West Pomerania Province (12). The horse groups were formed considering the following parameters: sex (gelding, mare) age (4–9, 10–15, 16–24 years of age), breed type (pony, Hucul, small and large horse), body size (pony, small). The studies examined three basic zoometric measurements that served as the basis for calculation of conformation indices: massiveness, boniness and overbuilding. It was concluded that the centers under study possess horses, mostly geldings (64%) commonly aged 10–15 years (42.5% of population), whose diverse body size and height allow meeting the needs of the treated patients. Anatomical features of horses and pony-type crossbreds prove to be determinants, to a great extent, of a special predilection of this breed type for hippotherapy. Notable breed variability of horses used in equine therapy programs indicates a necessity of considering a horse breed type while analyzing their suitability for equine-assisted activity in terms of the horse exterior assessment.

Key words: horses, hippotherapy, animal-assisted activities, conformation

Corresponding author: Angelika Cieśla, Unit of Horse Breeding and Animal Assisted Therapy, West Pomeranian University of Technology, Szczecin, Doktora Judyma 12, 71-466 Szczecin, Poland, e-mail: angelika.ciesla@zut.edu.pl

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INTRODUCTION

Equine conformation is a key criterion in the selection process of horses to be included in a hippotherapy program. Importance of the horse exterior is critical as the effect of its anatomical structure and equine gait at the walk, which is most often utilized in therapy, a patient (through an adaptive movement pattern of the pelvis) gets responsive sensory stimulation regarded a specific rehabilitation tool. Despite this correlation, the studies on horses in the Polish hippotherapeutic centers did not show relationships between the horse conformation and its match for rehabilitation of patients with specific spectrum of disabilities [Jackowski and Ryło 1994, Kaproń and Nowak 2000, Palacz and Cieśla 2007]. Then again, the periodic analyses of a body size and breed of horses that came into the therapy program help determine therapists' needs for a required horse structure and a breed type.

The present research aimed to establish basic conformation parameters of horses utilized in hippotherapy in chosen equine-assisted centers.

MATERIAL AND METHODS

The research material included 47 horses from the following 9 hippotherapeutic centers: in Warsaw (the Hippotherapy Foundation – 7 horses), Bydgoszcz (Bydgoszcz Hippotherapy Association – 3 horses, Equine Recreation Centre – Caritas Bydgoszcz Diocese – 3), Lublin and the region (Experimental Farm of University of Life Sciences in Lublin – 3 horses, Horse riding Club in Lublin – 2, HrC “Arizona” – 3, Nursing Home in Krasnystaw - 5), Cracow and the region (Equine Recreation and Rehabilitation Centre “Tabun” – 6 horses, Horse riding Club Bór – Toporzysko – 3 horses) and West Pomerania Province (Horse riding Centre in West Pomeranian University of Technology – 2 horses, Horse riding Centre “Michalski” – 5 horses, P.H.U. “Araber” – 3 horses, Hippotherapy Centre in Barlinek – 2 horses. Out of the aforementioned centres, five were certified by the Polish Hippotherapy Association (PHA).

Taking into account the height standards adopted and set out in the guidelines of the International Equestrian Federation (FEI) and Polish Equestrian Federation (PEA) for pony – below 148 cm height at withers, below 149 cm with shoes; for small horses – from 149 up to 156 cm height at withers, below 157 cm with shoes) and large horses – from 156 cm [Łukomski et al. 2012]. A category of small horses entailed horses of different warmblood breeds that do not satisfy the requirements for registration in a studbook or come from crossbreeding. Characteristics of horses from different regions of Poland is presented in Table 1. Two completely separate classifications were adopted for purposes of this study: “breed type”

(as specified in the horses documentation) and “body size type” – according to height at withers. Assuming a “breed type” as a distinguishing criterion, the horse population was divided into 4 groups:

- ponies (in a primitive horse type or with a high share of this blood, $n = 25$). The most differentiated breed group included the following breeds of horses: New Forest, Shetland, Haflinger, Fjord, Felin Pony, Arab-Konik horse, crossbred ponies and ponies of unknown origin;
- Huculs (height at withers within that of the pony range, $n = 11$);
- small horses ($n = 5$). This group comprises Tinker breed horses and those after Silesian horse x Hucul crossing;
- large horses ($n = 6$) including representatives of the breeds: Purebred Arabian, Małopolski, Wielkopolski and Polish Warmblood.

In the case of horses covered by the study, “body size type” and “breed type” classifications do not overlap so the horses were classified as follows: Tinkers according to breed classification are a small horses – but all tinkers were below 148 cm, so they were included as ponies in the “body size type” category. Small horses in “breed type” category included Goran (Silesian x Hucul) (so in the table in the “breed type” there are 5 small horses) – but according to the standard they would be the only one in this group, so they should be included to the group of large horses. According to “breed type” large horses [$(n = 6) : 1$ Wlkp, 3 PW, 1 M, 1 oo], Arabian horse and two Polish noble half-bred horses should be included in ponies (they were less than 148 cm at the withers) but they belong to the group of large horses if we consider type of breed (documentation of these horses). Then the large horse group included 3 horses and the Goran = 4 large horses in the tables. In conclusion according to “body size” the population was divided into two groups: ponies (ponies, Huculs, 4 horses from small horses group and 3 horses from large horses group, $n = 43$, 91.5% of all horses) and large horses (3 horses from large group horses and Goran, $n = 4$).

The present studies analyzed three basic zoometric measurements: height at withers (cm), chest girth (cm), left fore cannon bone circumference (cm) and calculated the conformation indices: massiveness, boniness and overbuilding according to the following formulas [Janiszewska and Cieśla 2006]:

$$\text{massiveness index} = \frac{\text{chest girth}}{\text{height at withers} \times 100\%};$$

$$\text{boniness index} = \frac{\text{cannon circumference}}{\text{height at withers} \times 100\%};$$

$$\text{overbuilt index} = \frac{\text{height at croup}}{\text{height at withers} \times 100\%};$$

Statistical analyses of the data related to the zoometric measurements of the therapy horses were made with software package SPSS 19. Verification if the traits studied (measurements and conformation indices) follow the normal distribution was performed using the Kolmogorov-Smirnov test (K-S test). The normal distribution of the aforementioned traits was established.

With the aim of explaining the effect of the chosen factors (sex, age, horse size, horse breed type) on the values of zoometric measurements and conformation indices, analysis of variance was made using least squares method (the GLM procedure) following the mathematical model:

$$y_{ijklm} = \mu + H_i + W_j + U_k + K_l + e_{ijklm}$$

where:

y_{ijklm} – measurements and index value,

μ – total mean,

H_i – effect of i -th sex of the horse, $i = 1, 2, 3$ (1: mares, 2: geldings),

W_j – effect of j -th age, $j = 1, 2, 3$ (1: 4–9 years, 2: 10–15 years, 3: 16–24 years),

U_k – effect of k -th size $k = 1, 2$ (1: large horse, 2: small horse),

K_l – effect of l -th horse's breed type, $l = 1..4$ (1: pony, 2: Hucul, 3: small horse, 4: large horse),

e_{ijklm} – random error.

The following significance levels were assumed: $P \leq 0.01$ highly significant and $P \leq 0.05$ significant.

Interpreting the statistical analyses results needs taking into account a fact of the limited number of horses within the tested traits which results from the data nature. The horses proven suitable for equine-assisted therapy made up a group of highly selected very special individuals with specific conformation, behavioral and psychical traits.

RESULTS AND DISCUSSION

The investigated horse population used in hippotherapy showed prevalence of geldings (64%) over mares (Table 1). The findings are consistent with the earlier observations of many authors. Nowicka-Posłuszna and Bielawska [1993] report that geldings accounted for 80% of horses utilized in three hippotherapeutic centers in Warsaw, Cracow and Poznań, Cieśla [2007] – 71%, Palacz and Cieśla [2007] – 67 and 70%, whereas Pluta [2009] – 61%.

The age of horses in the studied centers ranged between 4–24 years with majority of those aged 10–15 years that made 42.5% of the population (Table 1). A similar range of horse age in two hippotherapeutic centers was established by Palacz and Cieśla [2007], i.e. 4–22 years. According to Kosiniak-Kamysz et al.

[2000], horses most often employed in the therapy were aged 7–19 years (25% of the animals used), while in the studies by Cieśla [2007] 4–20 years, that is average 8.4 years old.

Table 1. Number of horses in hippotherapy from different regions of Poland and their general characteristics

Tabela 1. Liczba koni użytkowanych w hipoterapii w różnych regionach Polski i ich ogólna charakterystyka

	Warsaw Warszawa	West Pomerania Province województwo zachodnio- pomorskie	Lublin and the region Lublin i okolice	Kraków and the region Kraków i okolice	Bydgoszcz	Total Ogółem
Sex – Płeć						
Mare – Kłacz	–	8	5	2	2	17
Gelding – Wałach	7	4	8	7	4	30
Age – Wiek						
4–9 years – 4–9 lat	3	3	2	4	4	16
10–15 years – 10–15 lat	3	7	7	1	2	20
16–24 years – 16–24 lata	1	2	4	4	–	11
Breed type – Typ rasowy						
Pony – Kuc	2	8	10	2	3	25
Hucul – Hucul	3	1	1	6	–	11
Small horse – Koń mały	2	1	–	–	2	5
Large horse – Koń duży	–	2	2	1	1	6
Body size – Wielkość						
Pony – Kuc	6	10	12	9	6	43
Large – Duży	1	2	1	–	–	4
Total – Ogółem	7	12	13	9	6	47

The horses displayed different body structure associated with a different breed type. A varied type and equine exterior traits allow for meeting the needs of patients at different age and with diverse disability. A number of authors have highlighted substantial breed differentiation of horses involved in hippotherapy (Table 2). In the population of 59 horses from 22 hippotherapeutic centers in Poland, Kaproń and Nowak [2000] indicated that Huculs ($n = 20$) and Polish Koniks ($n = 13$) predominated. This fact pointed to evident suitability of the indigenous primitive horse breeds for the equine-facilitated therapy. Besides these breeds, there were representatives of other equine breeds in these studies: Purebred Arabian horses ($n = 4$), Shetland pony ($n = 4$), Mur-Insulan Arabian horse ($n = 4$), Anglo-Arabian horse ($n = 4$), Arab-Konik crossbreds ($n = 3$), Małopolski ($n = 7$). Alike, Nowicka-Postulszna and Bielawska [1993] confirmed that Huculs, Fjords and Polish Koniks suit the hipporehabilitation service best. Pluta and Firlej [2006] as well as Chmiel [2009] also pointed to an apparent breed predilection of Polish Konik for working with disabled patients but at the same time reported their negative features in this respect. Golonka [2006] indicating the suitability of the Polish Konik breed for equine therapy emphasized that selective breeding in this

case was oriented towards phenotypic traits most closely resembling those of a primitive horse. Importantly, the selection in the breeds most commonly used in hipporehabilitation service, e.g. Hucul, had a clearly different direction. The results reported by Cieśla [2007] showed that in the population of 34 horses from the hippotherapeutic centers under the patronage of the PHA in the northern and western part of Poland, Wielkopolski breed horses ($n = 9$) outnumbered Huculs ($n = 7$) and Polish Koniks ($n = 6$; Table 2).

The analyzed population of 47 horses from 9 hippotherapeutic centers comprised:

- Pony breed group: 1 New Forest and Shetland pony, 1 Arab-Konik crossbreeds, 2 Fjords, 3 Felin Pony, 5 Haflingers, 12 pony-type horses of unknown origin or crossbreeds, 11 Huculs,
- Small horse breed group: 4 Tinker breed horses and 1 crossbred,
- Large horse breed group: 1 Purebred Arabian, 1 Wielkopolski, 1 Małopolski, 3 Polish Warmblood horses (Table 2).

Nearly half of the tested horse population was made up by pony-type crossbreeds and Huculs. Furthermore, taking into account a relatively high number of horses of foreign breeds, it proves that besides Huculs, the horses of the native breeds do not fully meet the requirements of the hippotherapeutic programs. Consequently, the hippotherapeutic centers have been observed to pursue horses of foreign breeds and those from interbreeding. For this reason, the breed composition of the horse population under study does not support the opinion of Kaproń and Nowak [2000] indicating suitability of native primitive horse breeds for hippotherapy service. Besides Huculs, these centers did not employ purebred Polish Koniks. It appears that recently growing import of foreign breed ponies to Poland has naturally replaced the horses of this breed in hippotherapy activities. Foreign breed ponies take priority over Polish Koniks in fact that their long-term selective breeding has been directed towards the traits giving this breed great usability as a saddle horse for kids. Another reason for a lack of Polish Konik representatives in the present research may be that the hippotherapeutic centers in north-eastern Poland still remain outside the control, yet breeding such horses is common and popular in this region.

The conformation of 68% of horses represented a lying rectangular frame (horse length greater than its height at the withers). The mean values of basic measurements of the horse population under investigations were as follows: height at withers – 144.0 cm, girth circumference – 180.2 cm, cannon bone circumference – 20.1 cm (Table 4, 5, 6). These results are in line with those reported by Cieśla [2007] with respective 143.8–175.9–19.9 cm dimensions of 34 horses used in the therapy service. The height of horse is recognized one of the key traits considered at horse selection for equine-assisted therapy as it has direct influence on

Table 2. Percentage of different breed horses used in hippotherapy in the present study and of other authors

Tabela 2. Procentowy udział ras koni użytkowanych w hipoterapii w badaniach własnych i innych autorów

Breed – Rasa koni	Author, usage place* Autorzy, miejsce użytkowania*				
	1.	2.	3.	4.	5.
Large horses – Konie duże					
Purebred Arabian breed – Czysta krew arabska	–	6.7	–	–	2.1
Wielkopolska	6.7	–	25	–	2.1
Małopolska and angloarabians	–	19	–	9	2.1
Polish Warmblood – Szlachetna półkrew	–	–	–	9	6.4
Silesian – Śląska	6.7	–	–	–	–
Crossbreds – Mieszańce	33.3	–	–	–	–
Small horses – Konie małe					
Tinker	–	–	–	–	8.5
Arabo-murinsulany**	6.7	6.7	–	–	–
Other crossbreds – Inne mieszańce	–	–	3	–	2.1
Pony-type horses – Konie w typie kuca					
Hucul breed – Huculska	13.3	34	21	28	23.4
Polish Konik – Koniki polskie	13.3	22	18	6	–
Arab-Konik crossbred – Arabo-koniki	–	5	–	6	2.1
Arab-Fjord crossbred – Arabo-fiordingi	6.7	–	–	–	–
Felin pony – Kuce Felińskie	–	–	–	15	6.4
Haflinger	–	–	9	–	10.6
Fiording	6.7	–	6	–	4.3
Shetland pony – Kuc szetlandzki	–	6.7	–	6	2.1
New Forest Pony	–	–	3	–	2.1
Pony-type crossbred – Mieszańce w typie kuca	6.7	–	15	21	25.5
Number of horses tested – Liczba badanych koni	15	59	34	33	47

*The sites of therapeutic use of horses:

1. Nowicka-Posłuszna and Bielawska [1993] – 3 centers (Warsaw, Cracow, Poznań),
2. Kaproń and Nowak [2000] – 22 centers throughout Poland,
3. Pluta [2009] – 9 centers (6 – Lublin and the region, 2 – Sandomierz, 1 – Warsaw),
4. Cieśla [2007] – 5 centers in northern and western Poland under the patronage of PHA,
5. The present studies [2013] – 9 centers in Warsaw, Bydgoszcz, Lublin, Cracow and the region, West Pomerania Province.

*Miejsce użytkowania koni:

1. Nowicka-Posłuszna i Bielawska [1993] – 3 ośrodki (Warszawa, Kraków, Poznań),
2. Kaproń i Nowak [2000] – 22 ośrodki z terenu całego kraju,
3. Pluta [2009] – 9 ośrodków (6 – Lublin i województwo lubelskie, 2 – Sandomierz, 1 – Warszawa),
4. Cieśla [2007] – 5 ośrodków północnej i zachodniej Polski objętych patronatem PTHip,
5. Badania własne [2013] – 9 ośrodków z Warszawy, Bydgoszczy, Lublina, Krakowa i okolic, województwa zachodniopomorskiego.

** Mur-Insulan – small thickened horse

** mur-insulany – małe konie pogrubione

securing patient on the horse and general therapy conditions [Łojek and Łojek 2013]. Understandably, highly significant differences occurred between the groups of horses formed on account of a size type and horse breed type. Similarly in the case of the mean values of boniness index (Table 7). A difference in height at the withers between large and small horses reached over 20 cm. Significant differences between the breed types and size types indicate that analysis of horse

suitability for hippotherapy should include these factors because of the slightly different exterior of each type. There are traits recognized as faults in a given horse group and as breed traits in another (e.g. shape and size of neck, size of hooves). Great conformational differentiation of horses in therapy service is confirmed in the studies of other authors. Cieśla [2007] reported the lowest height at withers – 130 cm and the highest as many as 167 cm (Wielkopolski); the same range of height was established several years ago by Nowicka-Posłuszna and Bielawska [1993], that is 129.5 cm (Polish Koniks) and 176 cm.

Table 3. Comparison of mean basic measurements of Hucul horses used in therapy in the present studies and of other authors

Tabela 3. Porównanie podstawowych pomiarów koni huculskich użytkowanych w hipoterapii w badaniach własnych i innych autorów

Measurements Pomiary	Author, usage place* – Autorzy, miejsce użytkowania*				
	1.	2.	3.	4.	5.
Height at the withers – Wysokość w kłębie, cm	137.3	135.7	135.8	133.9	139.1
Girth circumference – Obwód klatki piersiowej, cm	171.3	168.5	178.9	167.1	174.0
Cannon bone circumference – Obwód nadpęcia, cm	19.3	18.2	17.7	17.9	18.3
Height at croup – Wysokość w krzyżu, cm	–	135.8	–	–	138.5
Index of massiveness – Indeks masywności, %	–	124.2	–	124.9	125.1
Index of boniness – Indeks kościistości, %	–	13.4	–	13.3	13.9
Index of overbuilding – Indeks przebudowania, %	–	100.1	–	–	99.5
Number of horses tested – Liczba badanych koni	2	20	10	7	11

* The sites of therapeutic use of horses:

1. Nowicka-Posłuszna and Bielawska [1993] – 3 centers (Warsaw, Cracow, Poznań),
2. Kaproń and Nowak [2000] – 22 centers throughout Poland,
3. Kosiniak-Kamysz et al. [2000]; riding center UA, Cracow,
4. Cieśla [2007] – 5 centers in northern and western Poland under the patronage of PHA,
5. The present studies (2013) – 9 centers in Warsaw, Bydgoszcz, Lublin, Cracow and the region, West Pomerania Province.

* Miejsce użytkowania koni:

1. Nowicka-Posłuszna i Bielawska [1993] – 3 ośrodki (Warszawa, Kraków, Poznań),
2. Kaproń i Nowak [2000] – 22 ośrodki z terenu całego kraju,
3. Kosiniak-Kamysz i in. [2000] – ośrodek jeździecki AR w Krakowie,
4. Cieśla [2007] – 5 ośrodków północnej i zachodniej Polski objętych patronatem PTHip,
5. Badania własne [2013] – 9 ośrodków z Warszawy, Bydgoszczy, Lublina, Krakowa i województwa zachodniopomorskiego.

A harmonious body structure of horse is one of the factors affecting its movement and, as a rule, conformation indices characterize the horse exterior better than its absolute dimensions. Mean conformation indices of the horses under the study are summarized in Table 7. A balanced structure optimizes the horse's economy of movement and thus, lowers the probability of possible disorders and injuries while working. A correctly balanced horse from front to back is one with height at withers close to or slightly above the height at croup (the topline) when horse's center of gravity is more shifted to the back. That was established in the horses under present study and manifested by the general mean overbuilt index 99.2% (Table 7). This value appears to be lower than those calculated for the the-

Table 4. Least squares means and standard errors of height at withers mean values of hippotherapeutic horses depending to sex, age and horse body size class, cm

Tabela 4. Średnie najmniejszych kwadratów i błąd standardowy średnich wysokości w kłębie koni hipoterapeutycznych w zależności od płci, wieku i przynależności konia do klasy wielkości, cm

Factor Czynnik	n	LSM	SE	Significance interval 95% 95% przedział ufności		P
				Min.	Max.	
Sex – Płeć						
Mare – Klacz	17	143.5	2.01	139.4	147.5	0.637
Gelding – Wałach	30	144.6	1.55	141.5	147.7	
Age – Wiek						
4–9 years – 4–9 lat	16	143.7	1.97	139.7	147.6	0.897
10–15 years – 10–15 lat	20	144.7	1.86	140.9	148.5	
16–24 years – 16–24 lata	11	143.7	2.36	138.9	148.5	
Body size type – Typ wielkości						
Large horse – Duży koń	4	159.3	3.93	151.3	167.2	0.000
Pony – Kuc	43	139.1	1.15	136.7	141.4	
Breed type – Typ rasowy						
Pony – Kuc	25	137.3	1.37	134.5	140.0	0.000
Hucul – Hucul	11	139.1	2.07	135.0	143.3	
Small horse – Koń mały	5	146.4	3.07	140.2	152.6	
Large horse – Koń duży	6	154.5	2.80	148.9	160.1	
Total – Ogółem	47	144.0	1.33	141.3	146.7	

Significance levels assumed: $P \leq 0.01$ highly significant and $P \leq 0.05$ significant.Przyjęto poziomy istotności: $P \leq 0,01$ za wysoko istotny i $P \leq 0,05$ za istotny.

Table 5. Least squares means and standard errors of chest girth mean values of hippotherapeutic horses depending on sex, age and horse body size class, cm

Tabela 5. Średnie najmniejszych kwadratów i błąd standardowy średnich obwodu klatki piersiowej koni hipoterapeutycznych w zależności od płci, wieku i przynależności konia do klasy wielkości, cm

Factor Czynnik	n	LSM	SE	Significance interval 95% 95% przedział ufności		P
				Min.	Max.	
Sex – Płeć						
Mare – Klacz	17	180.2	3.59	173.0	187.5	0.991
Gelding – Wałach	30	180.3	2.78	174.6	185.9	
Age – Wiek						
4–9 years – 4–9 lat	16	175.7	3.52	168.6	182.8	0.181
10–15 years – 10–15 lat	20	184.4	3.33	177.7	191.1	
16–24 years – 16–24 lata	11	180.6	4.22	172.0	189.1	
Body size type – Typ wielkości						
Large horse – Duży koń	4	200.1	6.72	186.5	213.6	0.003
Pony – Kuc	43	173.4	1.97	169.4	177.3	
Breed type – Typ rasowy						
Pony – Kuc	25	170.8	2.54	165.7	176.0	0.006
Hucul – Hucul	11	174.0	3.84	166.3	181.7	
Small horse – Koń mały	5	186.9	5.69	175.4	198.4	
Large horse – Koń duży	6	190.5	5.19	180.0	201.0	
Total – Ogółem	47	180.2	2.39	175.4	185.1	

Significance levels assumed as highly significant, $P \leq 0.01$, and significant, $P \leq 0.05$.Przyjęto poziomy istotności: $P \leq 0,01$ za wysoko istotny i $P \leq 0,05$ za istotny.

Table 6. Least squares means and standard errors of cannon girth mean values of hip-therapeutic horses depending to sex, age and horse body size class, cm

Tabela 6. Średnie najmniejszych kwadratów i błąd standardowy średnich obwodu nadpęcia koni hipoterapeutycznych w zależności od płci, wieku i przynależności konia do klasy wielkości, cm

Factor Czynnik	n	LSM	SE	Significance interval 95% 95% przedział ufności		P
				Min.	Max.	
Sex – Płeć						
Mare – Klacz	17	19.9	0.41	19.0	20.7	0.364
Gelding – Wałach	30	20.3	0.32	19.7	21.0	
Age – Wiek						
4–9 years – 4–9 lat	16	20.2	0.40	19.4	21.0	0.945
10–15 years – 10–15 lat	20	20.0	0.38	19.2	20.8	
16–24 years – 16–24 lata	11	20.1	0.48	19.1	21.1	
Body size type – Typ wielkości						
Large horse – Duży koń	4	21.4	1.08	19.2	23.5	0.000
Pony – Kuc	43	19.1	0.32	18.5	19.7	
Breed type – Typ rasowy						
Pony – Kuc	25	18.7	0.28	18.1	19.2	0.000
Hucul – Hucul	11	18.3	0.43	17.4	19.1	
Small horse – Koń mały	5	22.7	0.63	21.4	24.0	
Large horse – Koń duży	6	21.0	0.58	19.8	22.2	
Total – Ogółem	47	20.1	0.27	19.5	20.6	

Significance levels assumed as highly significant, $P \leq 0.01$, and significant, $P \leq 0.05$.

Przyjęto poziomy istotności: $P \leq 0,01$ za wysoko istotny i $P \leq 0,05$ za istotny.

rapy horses in two hippotherapeutic centers studied by Palacz and Cieśla [2007], i.e. 101.6 and 100.74%. Kaproń and Nowak [2000] performing measurements of different breed horses engaged in hippotherapy found the overbuilt index within the 100.08–100.56% range for Huculs, Polish Koniks, Mur-Insulan Arabian, Half-bred Anglo-Arabian and Arab-Konik crossbred horses, while the indices below 99% in Małopolski and Purebred Arabian horses (ca.98.7%) as well as Shetland Pony (97.8%). In the present researches on large horses representatives of the warmblood breeds, a difference in favor of height at withers was more noticeable than in the case of ponies and small horses, however the differences between the mean values were not significant statistically.

Mean value of massiveness index (Table 7) – 125.1% as comparing to the mean boniness index of 13.9% implies that hippotherapy gives advantage to horses of massive structure, a draft horse type with the indices above 125 and 13.5% respectively [Janiszewska and Cieśla 2006]. As Table 7 shows, the highest massiveness had a group of small horses: 127.7% – massiveness index and 15.6% – boniness index. A very close massiveness index was determined for the Fjord horses studied by Cieśla [2007], that is 127.4%. In these studies, apart from Fjords, three out of seven groups of breed therapy horses had massiveness index very close to 125% and higher.

Table 7. Least squares means and standard error of mean values of massiveness index, overbuilt index and boniness index of hippotherapeutic horses depending to sex, age and horse body size class, cm

Tabela 7. Średnie najmniejszych kwadratów i błąd standardowy średnich indeksu masywności, przebudowania i kościistości koni hipoterapeutycznych w zależności od płci, wieku i przynależności konia do klasy wielkości, cm

Factor Czynnik	n	Index – Indeks						P
		massiveness masywności		overbuilt przebudowania		boniness kościistości		
		LSM	SE	LSM	SE	LSM	SE	
Sex – Płeć								
Mare – Klacz	17	125.7	1.76	99.2	0.43	13.8	0.24	0.630, 0.887, 0.446
Gelding – Wałach	30	124.6	1.36	99.3	0.33	14.1	0.19	
Age – Wiek								
4–9 years – 4–9 lat	16	122.1	1.73	99.1	0.42	14.0	0.24	0.067, 0.207, 0.555
10–15 years – 10–15 lat	20	127.5	1.63	99.8	0.40	13.8	0.23	
16–24 years – 16–24 lata	11	125.9	2.07	98.8	0.51	14.0	0.29	
Body size type – Typ wielkości								
Large horse – Duży koń	4	125.1	3.44	97.2	0.80	13.4	0.59	0.680, 0.108, 0.000
Pony – Kuc	43	124.7	1.01	99.6	0.23	13.7	0.17	
Breed type – Typ rasowy								
Pony – Kuc	25	124.5	1.28	99.7	0.31	13.6	0.17	0.307, 0.089, 0.000
Hucul – Hucul	11	125.1	1.93	99.5	0.46	13.1	0.25	
Small horse – Koń mały	5	127.7	2.86	100.2	0.68	15.6	0.37	
Large horse – Koń duży	6	123.1	2.61	98.1	0.63	13.6	0.34	
Total – Ogółem	47	125.1	1.17	99.2	0.29	13.9	0.16	

Significance levels assumed as highly significant, $P \leq 0.01$, and significant, $P \leq 0.05$.

Przyjęto poziomy istotności: $P \leq 0,01$ za wysoko istotny i $P \leq 0,05$ za istotny.

Actually, a full comparison between the measurement results reported by other authors and those obtained in the present study cannot be made. The key hindrance, especially in the study by Kaproń and Nowak [2000] is a fact that these authors analyzed a horse population whose breed composition substantially differed from this investigated in the present research (see the aforementioned horse breed composition studied by both scientific teams). The only horse group occurring in both studies are Huculs, also addressed in the publications of Nowicka-Postulszna and Bielawska [1993], Cieśla [2007], Palacz and Cieśla [2007], Pluta [2009] and Kosiniak-Kamysz et al. [2000]. Table 3 compares the means of basic dimensions of Huculs used in hippotherapy obtained in the present studies and by other authors. It is noteworthy that the dimensions presented in this table are in line with the Program for Breeding Hucul Horses [2007] guidelines that set out height at withers for adult horses at 135–145 cm for stallions, 132–143 cm for mares; girth circumference to be greater by at least 30 cm than height at withers for both, stallions and mares; cannon bone circumference for stallions – 17–20 cm and 16–19 cm for mares.

The data presented in Table 3 imply that the frame of Hucul horses used in hippotherapy has changed a little during the past few years. It is particularly clear while comparing this study-based data and from the publication of Kaproń and Nowak [2000]. Currently, the Hucul horses working in hippotherapy are much higher (in both, height at withers and at croup), of more massive structure compared to that described in the publications from the year 2000 but with the same boniness retained. However, an upward trend for height at withers rather than at croup has been observed. This difference is likely to emerge from a fact that according to the Conservation of Genetic Resources Program for Hucul Horses [Tomczyk-Wrona 2010] Hucul horse breeding population is classified into two basic types, also mentioned by Kosiniak-Kamysz et al. [2000], as follows.

Type I – massive horses of a short thick, rather wide muscular neck, the back is wide and relatively long. The loins are usually long and broad, sometimes slightly sunken. The lower back is usually high, which at the low withers makes the croup look overbuilt. The croup is mostly level or a bit sloping and rounded. The chest is deep and broad with strongly sprung ribs. Horses of this type are commonly short-legged with relatively great as for Hucul breed height at withers (135–142 cm). Their tissue is less lean but more lymphatic. Kosiniak-Kamysz et al. [2000] emphasize that patients receiving a therapy with horses of this type need safety measures from upwards.

Type II – less heavy-boned horses, more edgy, lean and very strong, give a general impression of being more noble and smaller. The neck and its junction with the head is more noble, the withers are longer, the croup shorter and even sloping. The width of chest and croup is the same as in type I, yet chest depth is smaller and the shoulder part narrower. The height of the horses is smaller by 2–7 cm on average as against the first type horse. According to Kosiniak-Kamysz et al. [2000], use of the horses of this type needs providing appropriate safety measures for patients from the ground level.

Both descriptions indicate that the Hucul horses of the studied population are characterized by mixed traits, i.e. height at withers and massiveness pertain to type I, while tissue leanness to type II. It seems that the framework of the horse population tested was determined by their special usability in equine therapy, namely individual psychological qualities and skills that prove to be more important in the selection process for hippotherapy service than the conformation traits [Palacz and Cieśla 2007].

CONCLUSIONS

1. In the course of time, greater breed differentiation of horses used in equine therapy has been observed and consequently, differentiation of mean measurement values of horses from the population studied.
2. A high percentage of foreign breeds horses and from crossbreeding causes that, besides Huculs, Polish Koniks do not meet the requirements of hippo-therapy programs.
3. Anatomical traits of ponies and pony-type crossbreds make an important determinant of this breed type usability for equine-assisted therapy.
4. Great breed variability of horses engaged in hippotherapy points to essential inclusion of the breed type into analysis of horse usability for equine-oriented therapy in terms of equine exterior assessment.

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ANALIZA POKROJU KONI UŻYTKOWANYCH W HIPOTERAPII W POLSKICH OŚRODKACH HIPOTERAPEUTYCZNYCH

Streszczenie. Celem pracy było określenie podstawowych parametrów pokroju koni różnych ras używanych do hipoterapii w wybranych ośrodkach hipoterapeutycznych. Materiał stanowiło 47 koni pochodzących z 9 ośrodków: Warszawy (7 koni), Bydgoszczy (6), Lublina i okolic (13), Krakowa i okolic (9) i województwa zachodniopomorskiego (12). Wyróżniono grupy koni posługując się następującymi cechami: płeć (wałach, klacz), wiek (4–9 lat, 10–15, 16–24), typ rasowy (kuc, hucul, koń mały i duży), wielkość (kuc, duży). W badaniach dokonano analizy pokroju na podstawie 3 podstawowych pomiarów zoometrycznych oraz wyliczonych indeksów budowy, tj. masywności, kośćcistości i przebudowania. Na podstawie przeprowadzonych badań ustalono, że ośrodki posiadają osobniki, w większości wałachy (64%), wiek 10–15 lat (42,5% badanej populacji) o zróżnicowanej wielkości i wzroście umożliwiającym zaspokojenie potrzeb przyjmowanych pacjentów. Cechy anatomiczne koni i mieszańców w typie kuca w dużej mierze decydują o szczególnej przydatności tego typu rasowego do hipoterapii. Znaczne zróżnicowanie rasowe wykorzystywanych zwierząt w hipoterapii wskazuje na konieczność uwzględniania ich typu rasowego w analizie przydatności tych koni do hipoterapii z punktu widzenia oceny pokroju.

Słowa kluczowe: konie, hipoterapia, terapia z udziałem zwierząt, pokrój

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