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### **Characteristics of the trunks of horses used for classic hippotherapy**

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Charakterystyka tułowia koni wykorzystywanych w hipoterapii klasycznej

**Summary.** With the view of characterising trunks of horses used in hippotherapy, a zoometric analysis was conducted on 33 specimens at 9 different locations. 61% of the examined animals were geldings and 39% were mares. The following breeds were represented: the Hucul (28% of the 33 horses), the Felin pony (15%), the Malapolski horse, the Polish noble half-bred horse (9% each), the Konik, the Arab-konik, the Shetland pony (6% each), the Bilgorajski horse (3%), together with 18% horses of unknown origin. The conducted measurements made it possible to prepare a graphic visualisation of the upper line (height and length) as well as the side line (width) of the trunks. An average length of the horse's back (used in therapy) ranged between 65.8 cm and 84.8 cm. An average width of the trunk measured at shoulder was between 34.0 cm and 37.2 cm, at back – 50.0 cm to 56.0 cm, and at croup – 42.0 cm to 48.6 cm. Trunk's cross section was found to be either oval or round. Centres where several horses (4 to 6) are kept and which are characterised by varying parameters, can satisfy the needs of all admitted clients, according to the principle that a patient's disability and weight determine the choice of a horse suitable for therapy. The various forms of the barrel make it a universal rehabilitation „tool”.

**Key words:** horse, hippotherapy, zoometric measurements, trunk shape

#### INTRODUCTION

Hippotherapy consists of interdependent equine-assisted therapeutic activities: rehabilitating, pedagogic, psychological, as well as psycho-social and resocializing elements. Hippotherapy is an interdisciplinary activity, in which healing, educational, leisure, and even sports elements intertwine, in accordance with the needs, requirements and capabilities of the client – patient, handicapped rider or sportsman [Hipoterapia 2005].

In such a wide spectrum, we can distinguish the classic hippotherapy, where it is the horse and its proper movement (movement of its trunk) that influences the patient rather

than the other way around. The patient, sitting on the horse's back, actively reacts to its movements. The primary goals of such a therapy are the improvement of posture, balance, equilibrium, mobility, and body functioning [Teichmann Engel 2004]. The decisive factor in choosing a horse for therapy is the client – his or her disability, height, weight, as well as the means of communicating with him or her. An adult horse walking (walk being the basic pace used in hippotherapy) conducts onto its rider ca. 110 multi-dimensional impulses swinging in various directions and dimensions (horizontal, vertical, skew, rotational) per minute. The movements of the horse, or rather its trunk, transferred onto the rider – his or her pelvis, hip joint, and lumbar spine (indirectly on the entire torso, shoulder girdle, neck and head), resemble the movement induced by the human walk [Wyżnikiewicz-Nawracała 2002, Strumińska 2003]. This is the main point of hippotherapy (not to mention others), impossible to achieve in any other movement therapy. So far, it has not been scientifically specified what concrete values (height, width and length) of the trunk (in cm) were characteristic for the horses used in hippotherapy. Undoubtedly, the most important value is the size – the available and possible trunk's surface which can be used for therapeutic purposes.

The aim of the present study was to tentatively specify and characterise the size of the horse's trunk in animals used for hippotherapy at chosen locations, as well as to try to prove the thesis that a horse's trunk can be a „universal therapeutic tool”.

#### MATERIALS AND METHODS

Study material was collected at nine locations, where hippotherapy treatment is implemented, whether as a primary or secondary equine-assisted activity. These locations include the following centres: Hippotherapy Foundation (Fundacja Hipoterapia) in Warsaw, Riding Section in Poniatowa (SJ Poniatowa), Education Centre in Kębło (OSW in Kębło), Chivalry Centre in Sandomierz (SOK), Bonanza Riding Section (SJ Bonanza), Riding Club in Lublin (LKJ), Experimental Ranch of the University of Life Sciences Felin in Lublin (ER Felin UP in Lublin), Social Help Home in Krasnystaw (DPS in Krasnystaw), and Rehabilitation-Education Centre in Sandomierz (ORE in Sandomierz).

The horses' overall characteristics included their breed, age and sex. Detailed analysis was conducted in order to represent trunk's shape in the examined specimens, including zoometric measurements, on the basis of which the upper and side trunk lines as well as its vertical cross section were determined. Measurements were carried out using basic zoometric tools: stick, tape and compass. Apart from the commonly recognised and used measurements (height at withers, height at back, chest depth, trunk width, chest girth, longitudinal trunk girth, cannon girth, breast width, croup width and length), new measurements were carried out (trunk girth at back, trunk girth at flank, withers-back distance as measured from the highest point of the withers to the lowest point of the back, back-sacrum distance as measured from the lowest point of the back to the highest point of the sacrum, withers-sacrum distance as measured between the highest points of the withers and the sacrum, width at shoulders as measured below the withers, width at back as measured below the usual height measurement point). On the basis of all these measurements, a relatively exact visualisation (of the shape of the upper trunk line and side projection of the trunk) as well as characteristics of varying trunk's form in examined horses at particular locations, were prepared. The results underwent statistical analysis

using the Microsoft Office Excel 2007 software. The significance of differences between the average value of each zoometric measurement of horses in particular centres was determined by means of the t-Student test, with the significance level of  $P \leq 0.05$  and  $P \leq 0.01$ .

## RESULTS AND DISCUSSION

Table 1 shows the varying number of horses depending on their breed, age and sex. Among nine locations, six horses were used in working with disabled clients at the first location, and four to five horses – at five other locations (locations: 2, 3, 7, 8, 9). Three locations used only one horse each for hippotherapy (locations: 4, 5, 6). The average number of horses used in hippotherapy was 3.66 ( $S = 2.06$ ). Although there is no requirement as to the breed, it is worth noticing, however, that even at the locations concerned, domestic primitive breeds such as the Hucul (hc), the Konik (kn) and their cross-breeds: the Bilgoraj horse (kb), the Felin pony (kf), the Arab-konik (ak) were preferred in hippotherapeutic work – these breeds constituted over 57% of the examined horses (out of 33 specimens). Noble breed horses constituted 18% of horses used – the same number as that of horses of unknown origin. Horses of different age are used at the same locations, which makes it possible to have more experienced, as well as younger (5–10 years old) horses working together, learning the ropes of demanding hippotherapeutic work. Only at the fourth location (SOK), does the Bilgoraj horse – a 21-year-old mare – work very well. Over 60% of the horses working at examined locations are geldings, mentally suited for this kind of work [Jackowski 1994, Strauß 1996, Kaproń and Nowak 2000]. As shown in Table 1, the presence of mares is also notable. At seven locations, at least 12 mares work in hippotherapy. At ER Felin UP in Lublin, the number of mares amounts to 4, which constitutes 80% of all the hippotherapeutic horses used there. It is due to the fact that apart from riding and drawing vehicles, the horses are used for breeding as well. The use of mares in hippotherapy may lead to breeding successors, which can be seen on the example of the daughter of the Korweta (kf) mare – Korona (kf), also working with disabled clients.

The results of zoometric characteristics of examined horses' measurements are shown in Table 2a, 2b and 2c. In centres where apart from breeds of small horses (hc, kn, kb, ak) and ponies (kf, Shetland), horses of noble breeds (m, sp) are used in working with disabled clients, the average values, as well as their characteristic standard deviations, are higher (locations: 1, 2, 3, 8). At each of the locations 4, 5 and 6 there is only one horse working, so parameters of all of these specimens are presented in Table 2b. At the three locations, mainly children are treated. Only at the fifth location, if necessary, are adults treated and the client is assisted on the horseback (by a person sitting next to him or her). The best results, however, are recorded with several horses walking at various frequencies and amplitudes [Wyżnikiewicz-Nawracala 2002]. It is therefore important that the centres involved exclusively (or mainly) with rehabilitation (locations: 1, 3, 8, 9) have more horses with various zoometric parameters, which can meet the needs of different patients accepted for treatment. Strauß [1996] advises using horses 155–160 cm high, stressing that their height should correspond with the client's height. Teichmann Engel [2004] considers 142–152 cm a perfect size for a horse used for hippotherapy; he also highlights the rule: large (adult) patient – larger horse, small patient – smaller horse.

Table 1. Quantitative diversity of horses in centres according to breed, age and sex  
Tabela 1. Zróżnicowanie liczbowe koni w ośrodkach zależnie od rasy, wieku i płci

Centre Ośrodek	n	Breed – Rasa								Age (years) – Wiek (lata)				Sex – Płeć		
		hc	kn	kb	kf	ak	m	sp	szetl.	other inne	5–10	11–15	16–20	20<	gelding, w.	mare kl.
1. FH Warszawa	6	4				1		1			1	3	2		5	1
2. SJ Poniatowa	4					2	1	1			2	1	1		3	1
3. SOSW Kębło	5					1	1	1	3			2	3		3	2
4. SOK	1			1									1			1
5. SJ Bonanza	1		1									1	1			1
6. LKJ	1								1		1				1	
7. ER Felin UP	5	1			4					2	2	1	1		1	4
8. DPS Krasnystaw	5		1		1	1	1			3	1	1	1		4	1
9. ORE Sandomierz	5	4						1	1	1	2	2			3	2
Total – Ogółem	33	9	2	1	5	2	3	3	2	6	9	11	3	20	13	
%	100	28	6	3	15	6	9	9	6	18	28	33	3	61	39	

At the examined locations, the horses' average height at withers varies between 127.0 cm (ORE in Sandomierz) and 149.6 cm (SJ Poniatoŭa). Only at four locations were specimens exceeding 155 cm found (locations: 1, 2, 3, 8). A small horse may be used also for an adult client if its back's width, as the support surface, is proper and can sustain the client's weight [Strauŭ 1996]. Some authors, however, claim that a pony, with its more variable gait (as a result of its build – shorter step) can never be a suitable hippotherapeutic horse [Teichmann Engel 2004]. Obviously, for a hippotherapist assisting the rider from the ground (walking by the side of the horse), it is crucial that the height of the horse enable him or her to conduct a therapy in a safe and efficient way.

In the case of almost each zoometric measurement compared, significant or highly significant differences could be stated between the locations. Therefore, for the sake of clarity, the appearance of these differences was not shown in Table 2a, 2b and 2c. The most significant statistical differences concerned the following traits: height (at withers, back and sacrum), chest depth, trunk length, girths (chest girth and trunk girth as measured at back, flank and longitudinal trunk girth). Smaller number of significant, and specifically highly significant differences could be observed in the following constellations: cannon size, distance (withers-back, back-croup, withers-croup). Sporadic appearance of statistical differences could be observed in the following parameters: width at shoulders, width at shoulder blades, width at back, width at croup, and croup length. Smaller statistical differences in the case of parameters concerning the barrel (distance and width) at different locations may suggest a demand for such a „model” of the trunk both for child and adult patients.

A horse copes with the rider's weight best when the rider sits exactly over its centre of gravity, i.e. centre of balance [Swift 2005]. Unfortunately, it is not always possible in hippotherapy. Working with patients with various levels of disability and occasional need for assistance on the horseback puts additional strain of the weight of the assisting person far from the horse's centre of gravity and towards the back – lumbar section, where the spine is weakest [Teichmann Engel 2004, Łojek 2006].

Various methods of rehabilitation are employed in modern physiotherapy (Vojty, Brunkow, Kabata, NDT Bobath, Domana-Delacato and Klein-Vogelbach *et al.*) [Nowotny 1998], which can use specialist rehabilitation equipment to achieve their therapeutic goals. Such equipment may include: balls, rollers, wedges, poufs, pears, sensory integration equipment – boards and suspended rollers, balance beams and others. Obviously, each piece of equipment, e.g. balls and rollers is designed in such a way that their size can be adjusted to suit the requirements of the rehabilitated person. Here are some example sizes: balls – diameter from 45 to 95 cm, rollers – diameter from 12 to 70 cm and length from 20 to 150 cm. Nowadays, the choice of such tools is very wide [Nowogrodzki 2008].

Since the beginning of its existence, hippotherapy has used the methods mentioned above which constitute the „classics” of physiotherapy [Strauŭ 1996, Strumińska 2003]. Can we thus compare equine-assisted therapy to other rehabilitating methods? The answer is yes, by all means. Leaving the house, leaving the therapy room, the presence of the horse, riding the horse and the opportunity to experience other positive aspects related to the horse (such as the company of other people and natural environment) all constitute clear benefits for the patient – in the physical as well as mental sense.

Table 2a. Zoometric measurements of horses in centres  
Tabela 2a. Zoometryczne pomiary koni w ośrodkach

Lp.	Measurements Pomiar	1. Hippotherapy Foundation in Warsaw Fundacja Hipoterapia w Warszawie, n = 6				2. Riding Section in Poniatowa Sekcja Jeździecka Poniatowa, n = 4			
		mean średnia	SD	max	min	mean średnia	SD	max	min
1.	height at withers – wys. w kłębie	144.3	9.40	156	134	149.6	27.97	168	100
2.	height at back – wys. w grzbiecie	137.2	8.54	149	129	142.4	26.00	155	96
3.	height at sacrum – wys. w krzyżu	142.2	8.07	154	135	148.0	26.01	165	102
4.	chest depth – gł. piersiowej	60.0	8.79	69	44	66.0	10.77	73	47
5.	trunk width – dł. tułowia	157.3	7.12	167	149	150.8	27.50	174	103
6.	chest girth – obw. kl. piersiowej	184.8	12.02	200	168	182.4	21.28	195	145
7.	trunk girth at back – obw. tuł. w grzbiecie	197.2	11.60	210	181	200.6	16.29	216	175
8.	trunk girth at flank – obw. tuł. w słabiznie	192.6	16.44	220	172	190.4	20.02	203	155
9.	longitudinal trunk girth – obw. podł. tułowia	377.0	21.45	410	350	375.8	47.80	411	293
10.	cannon's girth – obw. nadpęcia	20.9	1.02	22.0	19.5	19.9	1.52	22.0	18.0
11.	withers-back distance – odległ. kłab-grzbiet	33.2	2.23	36	30	30.4	5.68	36	21
12.	back-croup distance – odległ. grzbiet-zad	51.6	2.34	55	48	49.0	5.92	56	40
13.	withers-croup distance – odległ. kłab-zad	84.8	3.66	90	80	79.4	11.50	92	61
14.	width at shoulder – szer. w barkach	33.6	6.22	42	28	39.0	8.12	45	25
15.	width at shoulder blades – szer. w łopatkach	37.2	3.43	41	32	37.2	4.44	41	30
16.	width at back – szer. w grzbiecie	50.3	1.03	51	49	50.0	2.55	52	46
17.	croup width – szer. zadu	48.6	1.63	51	46	48.4	5.13	53	40
18.	croup length – dł. zadu	50.8	2.86	56	48	48.2	8.58	54	33

Table 2b. Zoometric measurements of horses in centres  
Tabela 2b. Zoometryczne pomiary koni w ośrodkach

L.p.	Measurements – Pomiar	3. Special Education Centre in Kębło Specjalny Ośrodek Szkolno- -Wychowawczy w Kębło, n = 5				4. SOK n = 1	5. SJ Bonanza n = 1	6. LKJ n = 1	7. ER Felin UP In Lublin; GD Felin UP w Lublinie, n = 5			
		mean średnia	SD	max	min				mean średnia	SD	max	min
1.	height at withers – wys. w kłębie	144.8	10.33	160	136	130	134	128	135.6	4.51	140	128
2.	height at back – wys. w grzbiecie	138.2	10.40	154	128	125	126	122	126.4	4.34	132	120
3.	height at sacrum – wys. w krzyżu	143.4	10.31	158	133	131	138	129	134.0	4.64	137	126
4.	chest depth – gł. kl. piersiowej	67.6	5.68	76	62	55	59	56	60.4	3.78	64	55
5.	trunk width – dł. tułowia	149.6	8.56	160	140	142	145	130	141.8	8.17	151	133
6.	chest girth – obw. kl. piersiowej	186.4	6.50	195	180	163	186	164	170.6	6.50	176	163
7.	trunk girth at back – obw. tuł. w grzbiecie	191.8	13.33	203	171	183	214	194	198.8	7.69	208	190
8.	trunk girth at flank – obw. tuł. w słabiznie	185.4	18.82	197	152	173	202	179	187.2	5.12	193	181
9.	longitudinal trunk girth – obw. podł. tutowia	369.0	25.56	400	335	362	384	328	358.0	15.92	378	340
10.	cannon's girth – obw. nadpęcia	20.6	1.29	22.5	19.0	16.0	20.0	19.0	18.4	1.08	20.0	17.0
11.	withers-back distance – odległ. kłab-grzbiet	32.4	4.34	38	28	30	32	30	31.8	1.64	34	30
12.	back-croup distance – odległ. grzbiet-zad	48.2	5.31	53	40	45	44	39	46.4	3.78	50	41
13.	withers-croup distance – odległ. kłab-zad	80.6	7.60	91	70	75	76	69	78.2	4.97	82	71
14.	width at shoulder – szer. w barkach	34.4	7.50	43	26	36	38	34	37.0	2.00	39	34
15.	width at shoulder blades – szer. w łopatkach	39.0	2.65	43	36	35	35	34	35.2	1.64	38	34
16.	width at back – szer. w grzbiecie	51.6	2.61	55	49	51	56	55	53.8	2.17	57	51
17.	croup width – szer. zadu	48.4	1.67	51	47	42	47	43	46.8	1.92	49	44
18.	croup length – dł. zadu	49.2	3.96	54	46	45	49	44	45.2	2.77	49	42

Table 2c. Zoometric measurements of horses in centres  
Tabela 2c. Zoometryczne pomiary koni w ośrodkach

Lp.	Centre, Ośrodek Measurements, Pomiar	8. Social Help Home in Krasnystaw Dom Pomocy Społecznej w Krasnymstawie, n = 5				9. Rehabilitation-Education Centre in Sandomierz Ośrodek Rehabilitacyjno-Edukacyjny w Sandomierzu, n = 5			
		mean średnia	SD	max	min	mean średnia	SD	max	min
1.	height at withers – wys. w kłębie	140.6	11.52	159	131	127.0	16.84	136	97
2.	height at back – wys. w grzbiecie	132.8	9.52	147	122	120.2	15.82	129	92
3.	height at sacrum – wys. w krzyżu	140.0	9.19	155	132	128.6	16.65	138	99
4.	chest depth – gł. kl. piersiowej	65.2	3.11	69	62	56.2	7.60	62	43
5.	trunk width dł. tułowia	148.6	12.12	170	141	134.0	17.59	146	103
6.	chest girth – obw. kl. piersiowej	183.2	10.28	198	175	162.2	15.35	179	137
7.	trunk girth at back – obw. tuł. w grzbiecie	199.8	11.01	216	189	183.8	10.38	197	175
8.	trunk girth at flank – obw. tuł. w słabiznie	186.6	11.70	199	172	170.4	16.20	188	146
9.	longitudinal trunk girth – obw. podł. tułowia	376.6	21.50	405	357	336.8	32.57	358	280
10.	cannon's girth – obw. nadpęcia	18.9	2.07	22.0	17.0	16.6	2.63	18.5	12.0
11.	withers-back distance – odległ. kłab-grzbiet	33.2	4.15	40	30	24.2	3.11	27	20
12.	back-croup distance – odległ. grzbiet-zad	44.0	4.85	52	40	41.6	2.61	46	40
13.	withers-croup distance – odległ. kłab-zad	77.2	7.66	86	70	65.8	5.07	73	60
14.	width at shoulder – szer. w barkach	38.8	1.48	41	37	35.0	3.67	38	29
15.	width at shoulder blades – szer. w łopatkach	37.0	2.45	40	34	34.0	2.35	37	32
16.	width at back – szer. w grzbiecie	52.2	2.49	54	48	51.0	3.74	57	48
17.	croup width – szer. zadu	46.0	2.00	48	44	44.4	4.93	48	36
18.	croup length – dł. zadu	47.0	3.94	53	42	43.4	6.35	49	33



The collected data made it possible to prepare a graphic visualisation of the shape of the upper line as well as projections of the side line of the horse trunks at the examined therapy centres. Pictures 1 to 6 show the variations of the shapes of the upper trunk line of the specimens used in six centres. The line begins at the highest point of the withers and continues through the lowest point of the back, towards the highest point of the sacrum (croup). On the axis 0-x, 5 cm is the smallest scale. On the basis of the conducted measurements of the distances between withers and back as well as back and sacrum, the upper line of the examined horses' barrels was visualised and compared (in an appropriate scale). Individual data from the centres with only one horse each were presented in Table 2b, therefore it was not included in the graphic visualisation. The greatest diversity of shapes and lengths of the upper trunk lines is visible in pictures 1, 3 and 5, which points to their universality and the ability of these centres to cater for the needs of virtually any patients admitted. The diversity also suggests the presence of a couple of horse breeds there (Table 1). In two centres: SJ Poniatowa and ORE in Sandomierz, the Shetland ponies are used, which are especially suitable for working with small children. However, their height (Pictures 2 and 6) forces us to bend down and to remain in such position, especially when the little patient requires our physical contact while securing him or her (difficulties with balance and an upright riding position). In such cases, short therapists fare better.

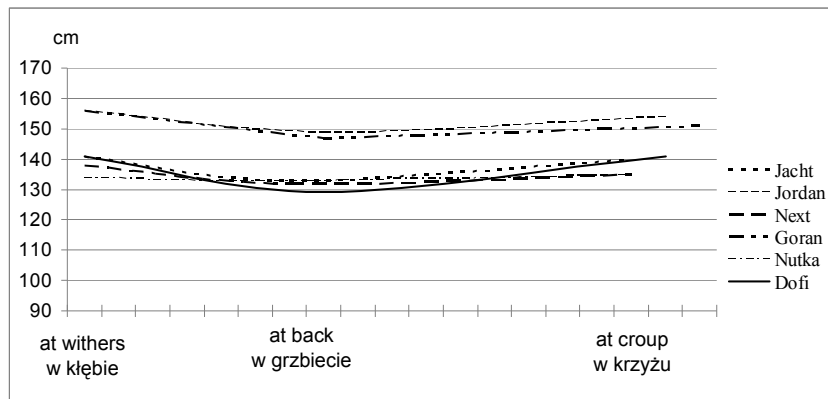


Fig. 1. The shape of the upper trunk line in Hippotherapy Foundation in Warsaw  
 Rys. 1. Kształt górnej linii tułowia koni w Fundacji Hipoterapia w Warszawie

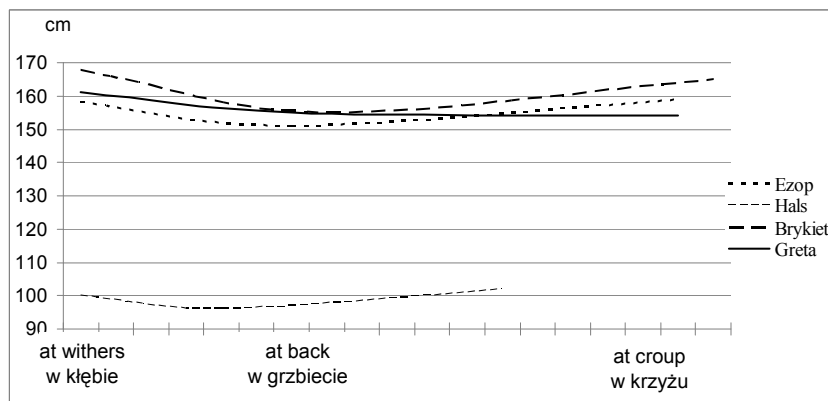


Fig. 2. The shape of the upper trunk line in Riding Section in Poniatowa  
 Rys. 2. Kształt górnej linii tułowia koni w Sekcji Jeździeckiej Poniatowa

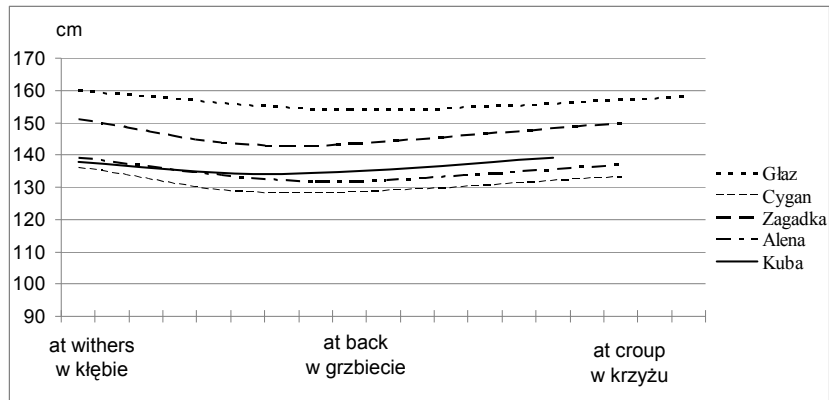


Fig. 3. The shape of the upper trunk line in Special Education Centre in Kębło  
Rys. 3. Kształt górnej linii tułowia koni w Ośrodku Szkolno-Wychowawczym w Kębło

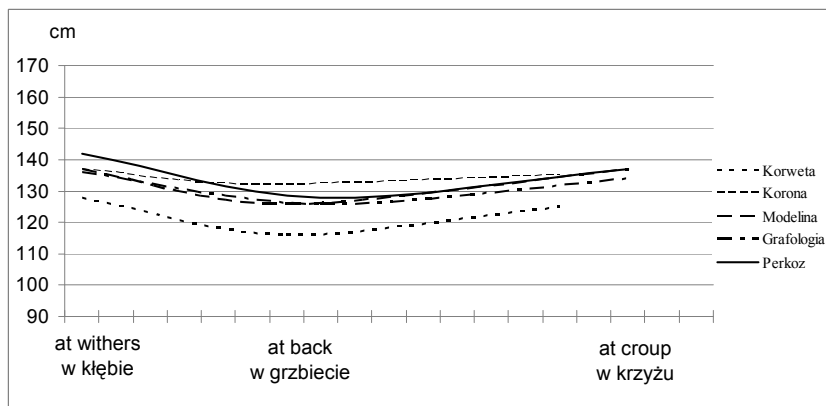


Fig. 4. The shape of the upper trunk line in ER Felin of the University of Life Sciences in Lublin  
Rys. 4. Kształt górnej linii tułowia koni w Gospodarstwie Doświadczalnym Felin UP w Lublinie



Fig. 5. The shape of the upper trunk line in Social Help Home in Krasnystaw  
Rys. 5. Kształt górnej linii tułowia u koni w Domu Pomocy Społecznej w Krasnymstawie

The shapes and lengths of the backs are important in any kind of horse use, which is highlighted by many authors [Prawocheński 1947, Sasimowski *et al.* 1984]. The withers should be prominent, but not high, and relatively wide, especially for patients with spastic lower limbs, or as wide as possible for other patients [Łojek 2006]. Long backs are more flexible and comfortable to sit on, but horses with such long backs may cause difficulties in adjustment and in maintaining proper riding position [Teichmann Engel 2004]. Such horses must be adequately trained to sustain weight and they must not be overburdened so as to prevent spinal disorders [Strauß 1996]. Such backs are suitable for lying down (prone or supine) of adult, tall patients. Horses in centres 1, 2, 3 and 8 are characterised by the longest backs (86–92 cm), which make such operations possible (Table 2a, 2b, Pictures 1, 2, 3, 5). In some horses, higher values at back than at withers could be noticed, as shown by the curves in pictures, as well as the data in Table 2a, 2b and 2c. The difference was never bigger than 4 cm and resulted from the horses good or very good condition.

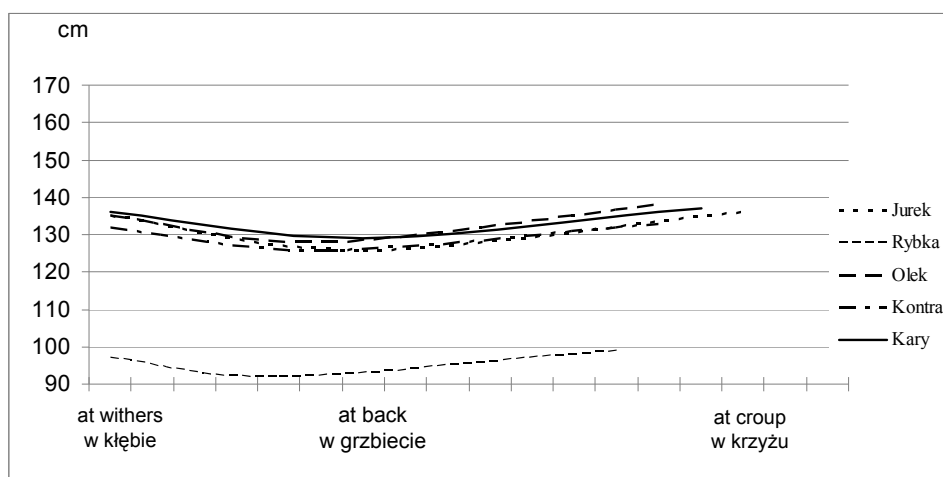


Fig. 6. The shape of the upper trunk line in Rehabilitation-Education Centre in Sandomierz  
Rys. 6. Kształty górnej linii tułowia koni w Ośrodku Rehabilitacyjno-Edukacyjnym w Sandomierzu

Pictures 7–12 show shapes (projections) of the horse trunk's sides. Both lines (symmetrical) begin from the width measured at shoulder blades, then at back and croup. In every picture, a certain anatomical feature of the trunk can be observed: relatively narrow front (at the shoulder blades), the widest part at the back, and a part of the croup (wider than the front). These sizes and proportions enable wide use of each part of the horse's barrel as a kind of „natural rehabilitation roller” for therapeutic purposes. The horizontal cross section of every specimen is specified in the pictures' legends (O – oval cross section, O – round cross section). Every centre with several horses has specimens exhibiting both types of barrel. Horses of noble breeds (or such type) normally have an oval cross section of the barrel (Jordan, Goran, Ezop, Brykiet, Greta, Głaz, Alena, Zagadka, and Drań horses), whereas horses of small breed and ponies have a round cross section (Next, Nutka, Dofi, Hals, Cygan, Kuba, Korweta, Grafologia, Perkoz, Timon, Karino, Jurek, Rybka, Kontra, and Kray horses).

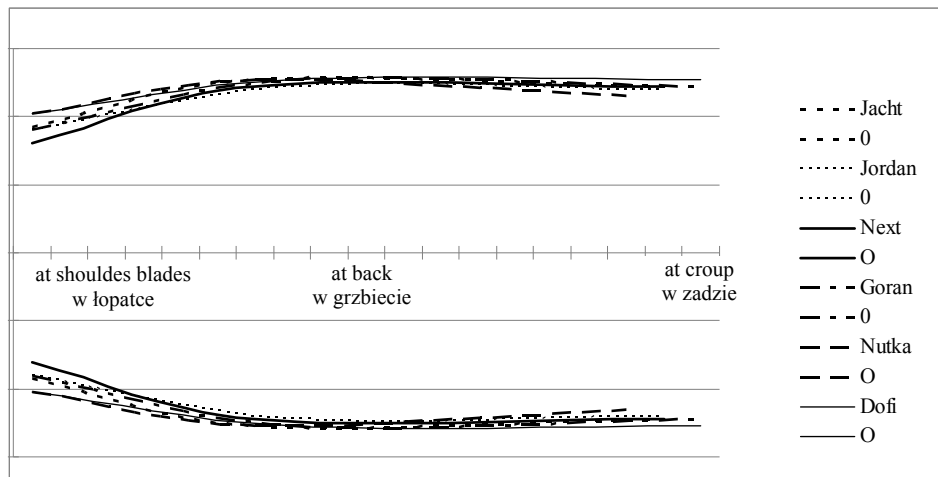


Fig. 7. The projection of the horse trunk's sides in Hippotherapy Foundation in Warsaw  
Rys. 7. Rzut boków tułowia koni w Fundacji Hipoterapia w Warszawie

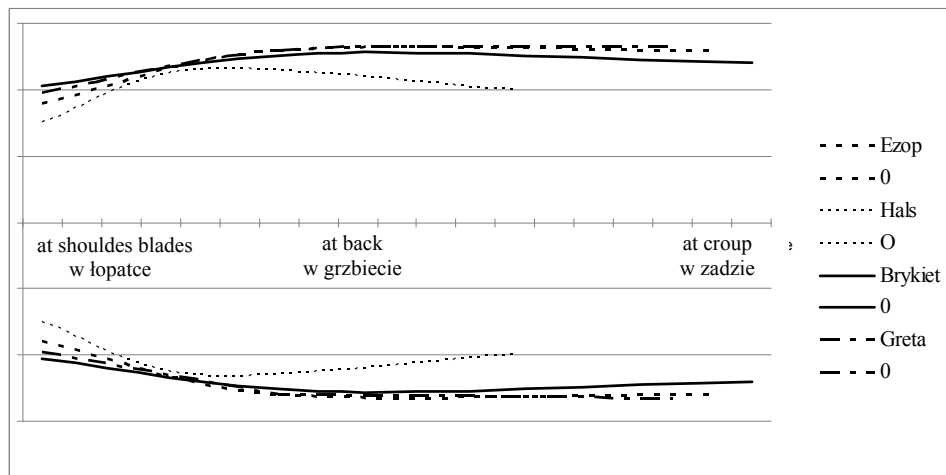


Fig. 8. The projection of the horse trunk's sides in Riding Section in Poniatowa  
Rys. 8. Rzut boków tułowia koni w Sekcji Jeździeckiej Poniatowa

Obviously, the shape of such „roller” depends on the type, condition and individual traits of a specimen. The chest form is dependent on the width of its parts. Generally, the shape of the chest resembles that of a cone, with its base towards the diaphragm, and the point towards the horse's chest. The bones of the first pair of ribs are flat, so as not to block the movements of the shoulder blades, which are then less hindered than with round ribs. The closer the ribs are to the back part, the more arched they become, which is coupled with a greater width and more round barrel [Prawocheński 1947].

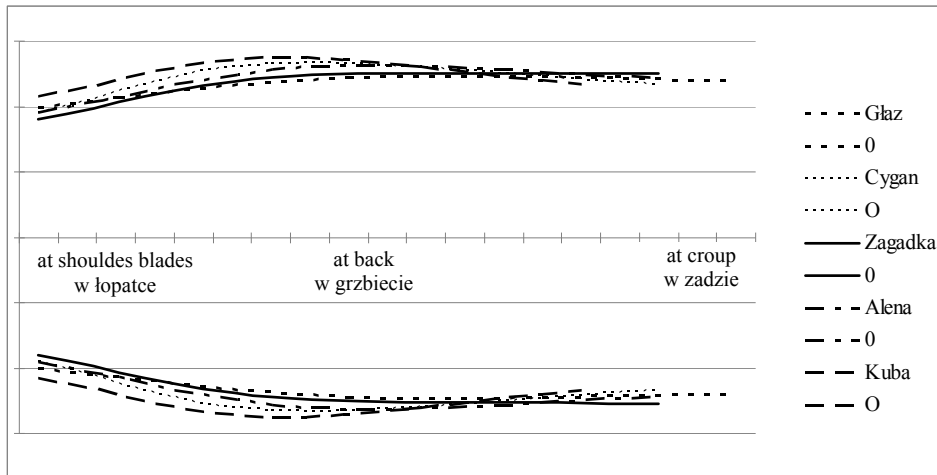


Fig. 9. The projection of the horse trunk's sides in Special Education Centre in Kębło  
 Rys. 9. Rzut boków tułowia koni w Ośrodku Szkolno-Wychowawczym w Kębło

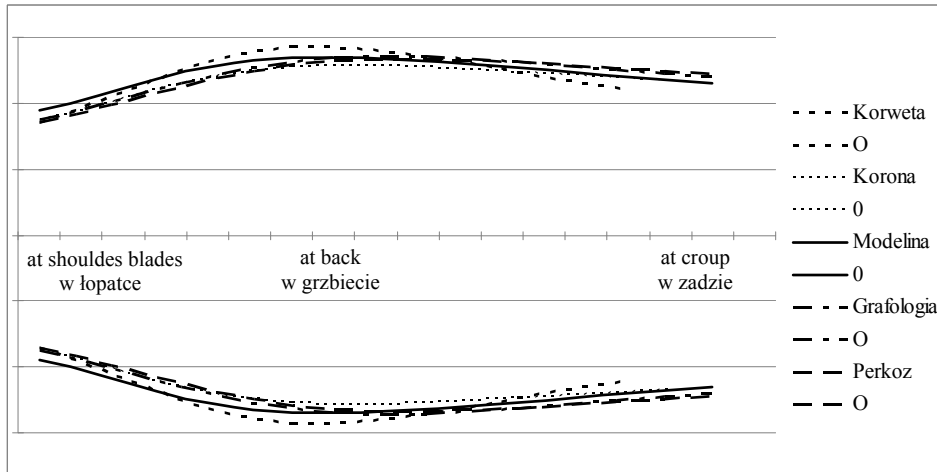


Fig. 10. The projection of the horse trunk's sides in ER Felin in Lublin  
 Rys. 10. Rzut boków tułowia koni w GD Felin UP w Lublinie

The oblong oval shape of the barrel is considered more beneficial, since it adjusts to the anatomical characteristics of the rider more easily. Undoubtedly, for patients with adductor spasticity and limited hip mobility, such shape is ideal [Strauß 1996]. It is however worth remembering that the round barrel shape may be more beneficial for a beginning rider (patient), because the horse that is too narrow or moves in a swaying gait will not make a steady support. The widest back section (57 cm, Table 2b and 2c) was reported in two mares: Korweta – kf (Picture 10) and Kontra – hc (Picture 12). Teichmann Engel [2004] also points to the chest depth, so that the client’s whole leg can rest on the horse’s side, giving him or her the sense of safety. Experts on natural mounting stress

that such contact (a kind of a massage of the inside of the limbs) helps understand the alternating movements of the animal and, consequently, their (the patients') alternating movement [Swift 2005]. In all the centres, the horses' trunk depth, varying between 55 and 76 cm (Table 2), made it possible to cater for the patient's needs in this area. Especially in the centres where several horses were kept, the width (at specific parts of the trunk) and the barrel shape enabled a very exact choice of the horse for every patient. Such a tendency is currently prevalent in Poland. It didn't use to be the case earlier, however, due to the lack of trained horses and experienced hippotherapists [Jackowski 1994, Kaproń and Nowak 2000].

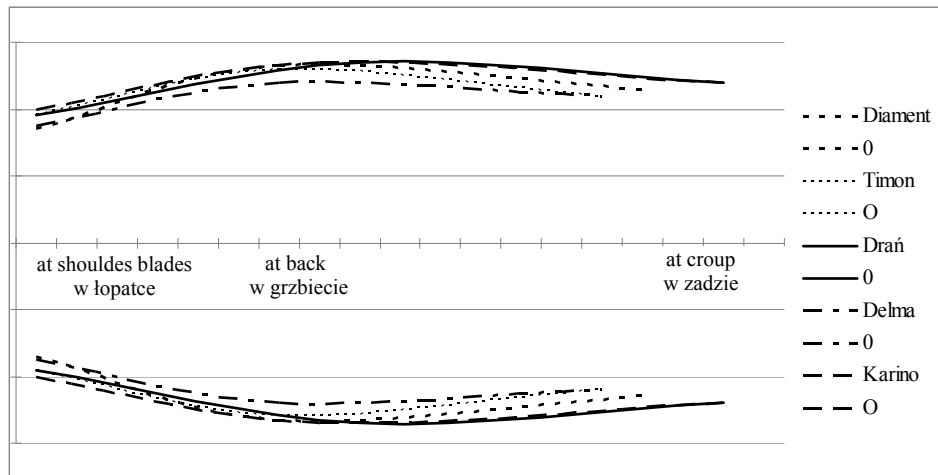


Fig. 11. The projection of the horse trunk's sides in Social Help Home in Krasnystaw  
Rys. 11. Rzut boków tułowia koni w Domu Pomocy Społecznej w Krasnymstawie

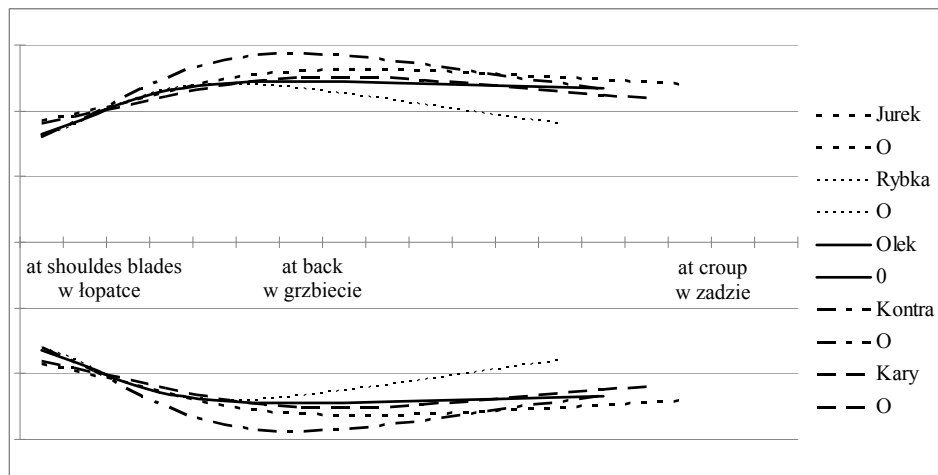


Fig. 12. The projection of the horse trunk's sides in Rehabilitation-Education Centre in Sandomierz  
Rys. 12. Rzut boków tułowia koni w Ośrodku Rehabilitacyjno-Edukacyjnym w Sandomierzu

A suitable form of horse's trunk, as well as the shape of rehabilitation tools, are the basis for properly conducted rehabilitation physiotherapy. One good therapeutic horse, however, can be a substitute for a mattress (wide trunk and croup), a therapeutic ball or roll (horse's barrel), wedge (neck, small width at the shoulder blades), as well as an exercise ladder (mane). The movement of the horse's back gives the patient a unique experience which is of great benefit to them. A walking horse induces, on a lying patient, movements similar to creeping; on a patient leaning on his or her arms and knees – movements similar to crawling; and on a sitting patient – movements similar to walking [Hipoterapia 2005].

#### CONCLUSIONS

On the basis of the conducted examinations, in correspondence with the main aim of the study, following summaries and conclusions may be formulated:

1. Centres specialising in working with disabled patients (centres: 1, 3, 8, 9) use horses with various barrel shape, thus catering for the needs of the admitted patients.
2. Barrel's parameters: length (61–91 cm), width, measured – at shoulder blades (30–43), back (46–57), croup (36–53), the shapes of the trunk's cross section (oval and round), as well as height at withers (97–168) lead to the conclusion that a horse's body can be a universal rehabilitation „tool”.
3. The above examinations are tentative and it would be interesting to conduct them on a larger scale, e.g. by including the analysis of the movements of individual sections of the barrel.

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**Streszczenie.** W celu scharakteryzowania tułowia koni wykorzystywanych w hipoterapii, analizie zoometrycznej poddano 33 osobniki w 9 ośrodkach. 61% badanych osobników to wałachy, 39% klacze. Konie należały do następujących ras: huculy (28% z 33 sztuk), kuce felińskie (15%), małopolskie, polskie konie szlachetne półkrwi (po 9%), koniki polskie, arabokoniki, szetlandy (po 6%), konie biłgorajskie (3%) i inne o nieudokumentowanym pochodzeniu (18%). Przeprowadzone pomiary pozwoliły na graficzne zobrazowanie przebiegu kształtu górnej linii (wysokości i długości) oraz bocznej (szerokości) tułowia zwierząt. Średnie długości grzbietu koni (wykorzystywanego w terapii) przyjmowały wartości od 65,8 do 84,8 cm. Średnie szerokości kłody mierzone w łopatkach wynosiły od 34,0 do 37,2 cm, w grzbiecie od 50,0 do 56,0 cm oraz w zadzie od 42,0 do 48,6 cm. Stwierdzono owalne i okrągłe kształty przekroju tułowia. W ośrodkach posiadających kilka koni (4–6 sztuk) o zróżnicowanych parametrach istnieje możliwość zaspokojenia potrzeb wszystkich przyjmowanych osób, według zasady, że niepełnosprawność pacjenta oraz jego ciężar determinuje wybór konia do terapii. Zróżnicowanie form kłody pozwala wykorzystać ją jako uniwersalny „przyrząd” rehabilitacyjny.

**Słowa kluczowe:** koń, hipoterapia, pomiary zoometryczne, kształt tułowia