

AN ATTEMPT TO DETERMINE THE RELATION BETWEEN HUCUL HORSES CONFORMATION ASSESSMENT, MOVEMENT AND COURAGE TEST RESULTS PART II. MARE FAMILIES

PRÓBA OKREŚLENIA ZALEŻNOŚCI MIĘDZY OCENĄ POKROJU, RUCHEM A WYNIKAMI PRÓB DZIELNOŚCI KONI HUCULSKICH CZ. II RODZINY ŻEŃSKIE

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Abstract

The objective of the research was to determine the relationship between evaluation of conformation and motion indicators and results of the Huculs' path and also to ascertain the courage (basic and elimination) of Hucul horses with their classification into mare families being taken account of. The scores of 116 horses presented for the evaluation of their exterior (championship breeding) were analyzed. The assessment covered the type, body conformation, movement in walk and trot as well as overall impression and preparedness for the exhibition. Measurements of length of steps, frequency and rate of the walk and trot were performed during the tests for courage. The estimated correlation coefficients exhibited the existence of some interesting trends i.e., there was positive correlation between values for type, body conformation, movement in walk and trot and the length of steps in walk and trot in individuals representing most of mare families. The reverse was the case with horses from the Sroczka and Wyderka families. Amongst the Wrona, however, negative correlations between the grade for walk and frequency of steps in walk was observed while that of between the result of path and utility tests was positive.

Keywords: Hucul horses, conformation, performance, mare families

Streszczenie

Celem przeprowadzonych badań było określenie zależności między oceną pokroju, a wskaźnikami ruchu i wynikami w ścieżce huculskiej i próbie dzielności (zasadniczej i eliminacyjnej) koni huculskich z uwzględnieniem ich przynależności do rodzin żeńskich. Analizie poddano wyniki uzyskane przez 116 koni przedstawionych do oceny eksterieru (championatu hodowlanego). Ocenie podlegały: typ, budowa, ruch w stępie i kłusie oraz wrażenie ogólne i przygotowanie do wystawy. Podczas przeprowadzanych prób dzielności użytkowej dokonano pomiarów długości kroków, częstotliwości i tempa w stępie i kłusie. Oszacowane wartości współczynników korelacji wykazały występowanie interesującej tendencji; u osobników reprezentujących większość rodzin żeńskich zaznaczyła się dodatnia zależność pomiędzy ocenami za typ, budowę, stęp i kłus a długością kroków w stępie i kłusie.

Słowa kluczowe: konie huculskie, pokrój, użytkowość, rodziny żeńskie

Detailed abstract

Badaniami objęto konie huculskie zgłoszone do prób dzielności w 2010 roku w Hawłowicach i Rudawce Rymanowskiej. Ocena eksterieru, tzw. championat hodowlany polegała na ocenie typu, budowy, ruchu w stępie i kłusie oraz wrażenia ogólnego i przygotowania do wystawy przez trzech niezależnych sędziów (za każdą cechę ocena do 10pkt). Ścieżka do zasadniczej próby dzielności składała się z 16, eliminacyjna z 22 przeszkód naturalnych lub sztucznych, wybranych z Regulaminu. Możliwa do uzyskania liczba punktów za ocenę pokroju wynosiła 50pkt, próbę terenową 80pkt. Podczas przeprowadzanej oceny ruchu koni prowadzonych w rękę dokonano pomiaru długości kroków, częstotliwości i tempa, w stępie i kłusie. Średnia ocena za typ dla wszystkich koni wynosiła $8,13 \pm 0,56$ punktu. Najwyższą punktację uzyskały osobniki z rodziny Sroczi ($8,42 \pm 0,77$ pkt.). Natomiast oceny sędziowskie dotyczące budowy były nieco niższe. W przypadku ocen za ruch (stęp i kłus) stwierdzono występowanie statystycznie istotnych różnic pomiędzy analizowanymi grupami. W badaniach własnych tylko w przypadku koni z rodziny Wrony, Polanki i Gurgul uzyskano dodatnie zależności między oceną budowy a wynikami prób terenowych. Może to sugerować, iż ocena eksterieru jest słabo powiązana z ewentualnymi predyspozycjami użytkowymi.

Introduction

The popularity gained by Hucul horses in recent years has been due to new trends in their use. The breeds specific traits have made them specifically suitable for touristic mountain rides, recreation and hippotherapy (Brzeski et al., 1995, Krzemień and Kario, 1991). The outcome of this growing popularity has led to the breeding of Hucul's horses on lowlands, which may result in loss of traits typical for highland horses (Purzyc, 2009). This being the more important since according to FAO recommendations, horses of the Hucul breed have been covered by the Genetic Resources Breeding Programme (Tomczyk-Wrona, 2010). The propagation of horse

breeding through which individuals of this race are characterized by higher efficiency of movement, usually not typical for highland horses, is also debatable. Exterior evaluation (championship breeds), being a factor of selection and grading ought to be accounted for in results attained by horses during utility tests of courage (Kaproń et al., 2006). The aim of the paper was to assess dependencies between conformation assessment performed during championships for breeds, movement indicators and results of Hucul horses' path and courage tests taking into consideration their belonging to the mare families.

Materials and methods

The Hucul horses that participated in courage tests in Hawłowice and Rudawka Rymanowska in 2010 constituted the research material. The basic field courage tests involves assessing the conformation and Hucul's path. In order to pass these tests the mares should obtain a minimum of 85 points with the stallions scoring 95 points. Horses can thus, based on these results, be included in the Genetic Resources Preservation Programme. The path elimination test, however, is a utility value test for individuals over 4 years of age.

116 individuals were registered for the tests. The exterior evaluation for championship breeds involves assessing the type, body conformation, movement in walk and trot as well as overall impression and preparedness for the exhibition by three independent judges in a 1 to 10 point scale. The final score is the average of the scores awarded. The maximum attainable score is 50 points. The path for the courage test is made up of 16 and 22 (for the basic and elimination respectively) natural or artificial obstacles in accordance with the regulations. The attainable number of points for the field path is 80 points. The ability to overcome obstacles in a suitable way and within a given time period is graded by a Panel of Judges.

During the tests of movement on hand-led horses the following were assessed i.e., length of steps – distance in meters during which a horse concluded 10 steps, frequency – number of steps taken by a horse in 15 seconds, rate – road distance in meters covered by a horse in 15 seconds walking and trotting (Brzeski et al., methodology, 1995). Two measurements were performed on each horse.

The collated material was statistically analyzed taking into consideration the fact that they belong to a mare family. The significance of deviation between groups was estimated using the Tukey's test. The dependencies between the exterior grading elements and length of steps, rate in walk and trot as well as the results of the courage tests for the group studied was performed by calculating the co-efficient of correlation. The calculations were based on the statistical pack – Statistica 9.0.

Results

The results of conformation evaluation for Hucul horses considering their belonging to mare families are presented in Table 1. The average score for type for all horses was 8.13 ± 0.56 points. The highest score of 8.42 ± 0.77 points was awarded individuals from the Srocзка family while the lowest was for representatives of Hungarian family (foreign) with 7.69 ± 0.44 points. The Judges' score for conformation assessment were somewhat lower ranging from 7.62 points for foreign horses to 8.03 points for representatives of Nakoneczna family. The scores for walk and trot turned out to be intriguing. Individuals from the Laliszka family attained the highest score of 8.27 ± 0.67 and 8.14 ± 0.68 points while those of the Żyrka family had the lowest. A relatively lower score, (7.56 ± 0.37), for walk was awarded horses from the Bajkałka family whilst the lowest, (7.60 ± 0.29), for trot for individuals from Hungarian family. In respect of grades for movement, i.e., walk and trot statistically significant differences between the groups analyzed were observed (Table 1).

Evaluation of movement indicators for Hucul horses is presented in Table 2. The longest distance, (16.45 ± 1.56 m), whilst taking 10 steps walking was covered by individuals representing Polanka family while the shortest was for a representative of Wrona family. The highest value of frequency of steps in walk as well as rate was obtained by an individual from Żyrka family while the lowest was for representatives from Srocзка and Nakoneczna families. The shortest distance for steps in trot, as in the case of walk, was characteristic of members from Wrona family while the longest, on the other hand, trotting value was obtained by a representative of Srocзка family (Table 2).

The correlation co-efficient between parameters for assessing conformation during championships for breeds and movement including results obtained in path and test of courage are presented in Table 3. The occurrence of significantly positive dependency between the overall grading and frequency of steps and rate in walk (0.565 ; $p = 0.044$ and 0.721 ; $p = 0.005$ respectively) and also between the overall grading and the score for courage test including results (0.726 ; $p = 0.005$; 0.562 ; $p = 0.046$) was observed in horses from Polanka family. An interesting tendency was observed in the case of representatives of Srocзка family. Whilst a negative correlation was observed between the scores obtained during championship for breeds and indicators of movement that of between scores for exterior assessment and courage tests were positive. This is worthy of note since horses belonging to this group obtained the highest average score for type.

A statistically significant positive dependency between the conformation assessment and steps frequency in trotting (0.983 ; $p = 0.017$) was observed in representatives of Nakoneczna family. In the case of horses from the Górkalka Nowosądecka family, however, a negative dependency between the scores obtained for conformation and rate of walk was observed. A similar tendency in respect of grades for conformation assessment and movement in walk and step frequency in walk (-0.982 ; $p = 0.003$ and -0.913 ; $p = 0.030$), between the grade for trot and step frequency in trot (-0.950 ; $p = 0.013$) as well as rate in trot (-0.959 ; $p = 0.010$) was also observed among mare

Table 1. Hucul horses conformation assessment during courage tests

Mare family	Number		Conformation assessment elements											
			Type		Conformation		Walk		Trot		General impression		General assessment	
			\bar{x}	SD	\bar{x}	SD	\bar{x}	SD	\bar{x}	SD	\bar{x}	SD	\bar{x}	SD
Wyderka	18	54	7.95	0.64	7.74	0.50	7.72a A	0.50	7.60 a A	0.45	8.31	0.43	39.32	1.83
Wołga	14	42	8.20	0.53	7.80	0.41	7.80b B	0.40	7.65 b B	0.47	8.46	0.40	39.93	1.45
Laliszka	11	33	8.29 a	0.45	7.77	0.47	8.27 abcdef ABCDEF	0.67	8.14 abcde ABC	0.68	8.62	0.65	41.09	2.58
Nakoneczna	6	18	8.36 b	0.64	8.03	0.53	8.11 g	0.40	8.08	0.57	8.64	0.51	41.22	2.36
Górkalka nowosądecka	6	18	8.29	0.53	7.92	0.52	7.78	0.25	7.81	0.39	8.53	0.44	40.30	1.68
Wrona	8	24	8.19	0.51	7.79	0.39	7.60 c C	0.57	7.69	0.41	8.42	0.48	39.69	1.69
Srocza	6	18	8.42 c	0.77	7.86	0.61	7.94	0.59	7.89	0.37	8.61	0.40	40.72	2.12
Bajkałka	8	24	8.17	0.48	7.71	0.64	7.56 dgh D	0.37	7.63 c	0.34	8.46	0.33	39.52	1.42
Agatka	6	18	7.97	0.74	7.67	0.62	8.11 h	0.63	8.08	0.62	8.64	0.51	40.47	2.69
Polanka	16	48	8.13	0.38	7.70	0.38	7.78 e E	0.34	7.71	0.42	8.39	0.38	39.71	1.18
Gurgul	6	18	8.17	0.54	7.75	0.52	7.97	0.50	7.89	0.44	8.64	0.23	40.42	0.82
Żyrka	1	3	7.83	0.29	7.67	0.29	7.33	0.29	7.50	0.0	8.00	0.0	38.33	0.0
Czeremcha	2	6	8.25	0.27	7.67	0.41	8.00	0.55	7.58	0.49	8.33	0.41	39.83	2.59
Foreign	8	24	7.69abc	0.44	7.62	0.41	7.63 f F	0.39	7.60 e C	0.29	8.37	0.39	38.91	1.25
General	116	348	8.13	0.56	7.76	0.49	7.84	0.52	7.77	0.50	8.47	0.45	39.97	1.82

Mean indicated by the same small letters differ significantly when $P \leq 0.05$; capital letters when $P \leq 0.01$

Table 2. Hucul horses movement assessment during courage test at walk and trot

Mare family	Measurement no	Walk						Trot					
		10 steps length (m)		Steps frequency (no/15s)		Tempo (m/15s)		10 steps length (m)		Steps frequency (no/15s)		Tempo (m/15s)	
		n	\bar{x}	SD	\bar{x}	SD	\bar{x}	SD	\bar{x}	SD	\bar{x}	SD	\bar{x}
Wyderka	36	15.95	1.58	15.92	2.65	25.13	3.13	23.15	3.18	23.14	4.54	52.91	10.26
Wołga	28	16.01	1.27	15.84	1.58	25.10	2.56	22.96	3.33	23.61	4.61	53.89	11.25
Laliszka	22	16.25	1.30	15.10	1.79	24.59	3.86	22.06	3.60	25.78	3.76	57.30	14.48
Nakoneczna	12	16.27	1.67	15.13	1.75	24.48	3.53	22.79	3.88	24.49	2.59	56.71	12.61
Góralka nowosądecka	12	15.47	1.91	16.48	2.45	25.16	2.13	23.07	3.69	26.46	2.10	58.18	9.52
Wrona	16	14.78	2.04	15.79	1.87	23.09	2.36	21.34	2.54	25.36	4.57	53.86	11.18
Srocza	12	15.43	1.50	14.61	1.58	22.53a	3.13	25.19	3.42	20.64	5.67	50.80	11.40
Bajkałka	16	15.25	1.41	16.45	1.09	25.06	2.65	21.44	2.35	26.23	3.74	55.90	8.55
Agatka	12	16.42	1.29	15.33	1.90	25.13	3.46	21.72	2.79	25.46	3.02	55.53	11.60
Polanka	32	16.45	1.56	15.59	1.72	25.54	2.91	23.68	3.57	24.60	4.87	57.54	11.76
Gurgul	12	15.77	1.27	16.82	1.62	26.48	2.83	24.06	2.83	24.72	4.84	58.89	10.76
Czeremcha	4	16.13	1.68	16.56	0.15	26.72	2.74	22.22	4.81	28.38	1.41	63.34	15.51
Żyrka	2	15.00	2.36	19.18	1.87	28.99	7.32	33.33	0.0	29.13	0.0	97.09	0.0
Foreign	16	15.90	1.61	16.83	1.44	26.70a	2.85	22.44	2.73	24.51	3.82	54.57	8.79
General	232	15.90	1.57	15.85	1.96	25.05	3.14	22.90	3.38	24.53	4.43	55.64	11.56

Mean indicated by the same small letters differ significantly when $P \leq 0.05$

representatives of Wrona. A high, positive and statistically significant dependency of (0.958; 0.911; 0.925 respectively) between the scores for movement in walk, overall impression including general assessment and results of field performance was, however, observed. A similar tendency was observed in respect of values for walk movement, Judges score for conformation and results for courage tests, which were statistically very significant (Table 3).

Whilst a high negative correlation between values for walk movement and step frequency including walk rate, step frequency including trot rate was noted for Srocza family, their results for courage tests were positive. As for representatives of Bajkalki family, a high value of correlation co-efficient, which was statistically significant between overall impression and distance in walk steps (0.931), values for between walk movement and trot rate (0.931), as well as between trot values and courage tests (0.922) were noted.

Table 3. Correlation between body conformation and Hucul horses movement and courage tests results

Trait	Walk			Trot			Test points	Test results
	Families	Steps length	Steps frequency	Rate	Steps length	Steps frequency		
Wołga								
Type	-0.356	0.162	0.029	-0.064	0.040	0.007	-0.208	-0.105
	p=0.256	p=0.614	p=0.929	p=0.843	p=0.902	p=0.982	p=0.516	p=0.745
Conformation	0.292	0.023	0.384	0.645*	-0.393	0.088	0.256	0.246
	p=0.357	p=0.944	p=0.218	p=0.024	p=0.207	p=0.786	p=0.422	p=0.440
Walk	0.582*	0.181	0.523	0.240	0.077	0.251	-0.404	-0.604*
	p=0.047	p=0.573	p=0.081	p=0.452	p=0.813	p=0.431	p=0.193	p=0.038
Trot	0.596*	-0.045	0.425	0.540	-0.097	0.308	-0.278	-0.314
	p=0.041	p=0.890	p=0.168	p=0.070	p=0.763	p=0.330	p=0.382	p=0.320
Overall impression	0.310	0.143	0.323	0.588*	-0.009	0.472	-0.068	0.059
	p=0.327	p=0.658	p=0.307	p=0.044	p=0.978	p=0.121	p=0.834	p=0.845
General assessment	0.320	0.002	0.412	0.703*	-0.205	0.348	0.045	0.064
	p=0.311	p=0.996	p=0.183	p=0.011	p=0.523	p=0.268	p=0.891	p=0.844
Wyderka								
Type	-0.201	0.506	0.488	-0.280	0.541*	0.357	-0.019	-0.165
	p=0.473	p=0.054	p=0.065	p=0.312	p=0.037	p=0.192	p=0.947	p=0.557
Conformation	0.042	0.124	0.216	-0.256	0.252	0.085	0.130	0.028
	p=0.881	p=0.658	p=0.440	p=0.357	p=0.366	p=0.763	p=0.645	p=0.921
Walk	0.488	-0.317	-0.056	0.334	-0.065	0.173	0.194	0.282
	p=0.065	p=0.249	p=0.844	p=0.224	p=0.819	p=0.537	p=0.488	p=0.308
Trot	-0.321	-0.132	-0.356	-0.164	-0.503	-0.591*	-0.220	-0.195
	p=0.244	p=0.638	p=0.193	p=0.560	p=0.056	p=0.020	p=0.430	p=0.485
Overall impression	-0.211	-0.081	-0.237	-0.414	0.199	-0.061	0.023	-0.062
	p=0.451	p=0.773	p=0.396	p=0.125	p=0.476	p=0.829	p=0.935	p=0.827
General assessment	-0.090	0.119	0.097	-0.303	0.261	0.063	0.087	-0.005
	p=0.749	p=0.672	p=0.731	p=0.272	p=0.347	p=0.824	p=0.759	p=0.987

*difference statistically significant at $P \leq 0.05$; ** at $P \leq 0.01$

Continuation of Table 3. Correlation between body conformation and Hucul horses movement and courage tests results

Trait	Walk			Trot			Test points	Test results
	Families	Steps length	Steps frequency	Rate	Steps length	Steps frequency		
Laliszka								
Type	0.631*	0.373	0.567	0.480	0.357	0.470	0.017	0.302
	p=0.037	p=0.259	p=0.069	p=0.135	p=0.281	p=0.145	p=0.960	p=0.367
Conformation	0.539	0.042	0.267	0.563	0.327	0.506	-0.041	0.200
	p=0.087	p=0.903	p=0.427	p=0.071	p=0.327	p=0.112	p=0.904	p=0.556
Walk	0.655*	0.268	0.485	0.585	0.292	0.503	-0.001	0.055
	p=0.029	p=0.426	p=0.131	p=0.059	p=0.383	p=0.114	p=0.997	p=0.873
Trot	0.562	0.164	0.353	0.468	0.046	0.322	-0.072	0.088
	p=0.072	p=0.629	p=0.287	p=0.146	p=0.894	p=0.333	p=0.835	p=0.797
Overall impression	0.595	0.523	0.689*	0.656*	0.536	0.677*	0.302	0.289
	p=0.053	p=0.099	p=0.019	p=0.029	p=0.089	p=0.022	p=0.366	p=0.388
General assessment	0.644*	0.314	0.529	0.592	0.428	0.584	0.086	0.117
	p=0.032	p=0.347	p=0.094	p=0.055	p=0.189	p=0.059	p=0.803	p=0.733
Nakoneczna								
Type	0.334	0.368	0.358	0.091	0.816	0.432	-0.494	0.380
	p=0.666	p=0.632	p=0.642	p=0.909	p=0.185	p=0.568	p=0.506	p=0.620
Conformation	0.775	0.871	0.840	0.695	0.983*	0.893	-0.929	-0.268
	p=0.225	p=0.129	p=0.160	p=0.305	p=0.017	p=0.107	p=0.071	p=0.732
Walk	0.577	0.280	0.439	0.158	0.605	0.400	-0.367	0.015
	p=0.423	p=0.720	p=0.561	p=0.842	p=0.395	p=0.600	p=0.633	p=0.985
Trot	0.523	0.695	0.621	0.469	0.906	0.707	-0.774	0.013
	p=0.477	p=0.305	p=0.379	p=0.531	p=0.094	p=0.293	p=0.226	p=0.987
Overall impression	-0.334	-0.594	-0.473	-0.715	-0.104	-0.490	0.494	0.735
	p=0.666	p=0.406	p=0.527	p=0.285	p=0.896	p=0.510	p=0.506	p=0.265
General assessment	0.482	0.416	0.459	0.165	0.853	0.503	-0.539	0.261
	p=0.518	p=0.584	p=0.541	p=0.853	p=0.147	p=0.497	p=0.461	p=0.739
Wrona								
Type	0.214	-0.160	0.080	0.552	-0.684	-0.271	0.583	0.573
	p=0.730	p=0.797	p=0.898	p=0.335	p=0.203	p=0.660	p=0.302	p=0.312
Conformation	0.609	-0.982 **	-0.301	-0.755	-0.440	-0.734	0.700	0.809
	p=0.275	p=0.003	p=0.622	p=0.140	p=0.459	p=0.158	p=0.188	p=0.097
Walk	0.767	-0.913*	-0.023	-0.393	-0.527	-0.620	0.958*	0.970**
	p=0.130	p=0.030	p=0.970	p=0.513	p=0.362	p=0.264	p=0.010	p=0.006
Trot	-0.134	-0.576	-0.822	-0.406	-0.950*	-0.959**	0.374	0.594
	p=0.830	p=0.309	p=0.088	p=0.497	p=0.013	p=0.010	p=0.535	p=0.291
Overall impression	0.610	-0.777	-0.067	-0.438	-0.467	-0.587	0.911*	0.865
	p=0.274	p=0.122	p=0.915	p=0.461	p=0.428	p=0.298	p=0.032	p=0.058
General assessment	0.536	-0.827	-0.232	-0.282	-0.785	-0.768	0.925*	0.977**
	p=0.352	p=0.084	p=0.707	p=0.646	p=0.115	p=0.129	p=0.025	p=0.004
Srocza								
Type	-0.577	-0.508	-0.603	-0.000	-0.651	-0.583	0.577	0.581
	p=0.423	p=0.492	p=0.397	p=1.0	p=0.349	p=0.417	p=1.00	p=0.419
Conformation	-0.133	-0.906	-0.842	-0.688	-0.875	-0.928	0.927	0.944
	p=0.867	p=0.093	p=0.158	p=0.312	p=0.125	p=0.072	p=0.073	p=0.056
Walk	-0.333	-0.997**	-0.975*	-0.577	-0.981*	-1.000**	1.000	0.999 **
	p=0.667	p=0.003	p=0.025	p=0.423	p=0.019	p=0.000	p=---	p=0.001
Trot	-0.522	-0.890	-0.929	-0.301	-0.899	-0.869	0.870	0.846
	p=0.478	p=0.110	p=0.071	p=0.698	p=0.101	p=0.131	p=0.130	p=0.154
Overall impression	-0.577	-0.508	-0.603	0.000	-0.651	-0.583	0.577	0.581
	p=0.423	p=0.492	p=0.397	p=1.0	p=0.349	p=0.417	p=1.00	p=0.419
General assessment	-0.698	-0.781	-0.878	-0.111	-0.900	-0.829	0.825	0.816
	p=0.302	p=0.219	p=0.122	p=0.889	p=0.100	p=0.171	p=0.174	p=0.184

*difference statistically significant * at $P \leq 0.05$; ** at $P \leq 0.01$

Continuation of Table 3. Correlation between body conformation and Hucul horses movement and courage tests results

Trait	Walk			Trot			Test points	Test results
	Families	Steps length	Steps frequency	Rate	Steps length	Steps frequency		
Góralka nowosądecka								
Type	0.456	-0.913	-0.650	0.471	-0.221	0.323	-0.249	0.206
	p=0.544	p=0.087	p=0.350	p=0.529	p=0.779	p=0.677	p=0.751	p=0.794
Conformation	0.327	-0.922	-0.760	0.380	-0.225	0.246	-0.128	0.276
	p=0.673	p=0.078	p=0.240	p=0.620	p=0.775	p=0.754	p=0.872	p=0.724
Walk	0.512	-0.849	-0.495	-0.345	-0.926	-0.527	0.420	0.861
	p=0.488	p=0.151	p=0.505	p=0.655	p=0.074	p=0.472	p=0.580	p=0.139
Trot	-0.858	0.018	-0.646	-0.614	-0.009	-0.517	0.786	0.431
	p=0.142	p=0.982	p=0.354	p=0.386	p=0.991	p=0.483	p=0.214	p=0.569
Overall impression	-0.460	-0.496	-0.920	0.087	0.155	0.100	0.226	0.191
	p=0.540	p=0.504	p=0.080	p=0.913	p=0.845	p=0.900	p=0.774	p=0.809
General assessment	0.002	-0.876	-0.956*	0.030	-0.314	-0.067	0.258	0.515
	p=0.998	p=0.124	p=0.044	p=0.970	p=0.686	p=0.933	p=0.742	p=0.485
Bajkałka								
Type	0.468	0.231	0.448	0.429	0.317	0.646	-0.203	0.716
	p=0.349	p=0.659	p=0.373	p=0.396	p=0.541	p=0.166	p=0.699	p=0.110
Conformation	-0.316	-0.135	-0.276	0.098	0.009	0.060	0.051	0.173
	p=0.542	p=0.798	p=0.596	p=0.853	p=0.986	p=0.911	p=0.923	p=0.742
Walk	0.764	0.146	0.632	0.384	0.586	0.931**	-0.117	0.433
	p=0.077	p=0.782	p=0.178	p=0.452	p=0.221	p=0.007	p=0.825	p=0.390
Trot	0.611	0.086	0.486	0.285	0.224	0.448	-0.712	0.922**
	p=0.198	p=0.872	p=0.328	p=0.584	p=0.670	p=0.373	p=0.113	p=0.009
Overall impression	0.931**	0.364	0.834*	0.430	0.375	0.728	-0.496	0.873*
	p=0.007	p=0.478	p=0.039	p=0.394	p=0.464	p=0.101	p=0.317	p=0.023
General assessment	0.443	-0.002	0.335	0.253	0.403	0.612	-0.424	0.786
	p=0.379	p=0.997	p=0.516	p=0.628	p=0.428	p=0.196	p=0.402	p=0.064
Agatka								
Type	0.656	-0.087	0.252	0.548	-0.103	0.304	0.116	0.343
	p=0.157	p=0.870	p=0.630	p=0.260	p=0.846	p=0.558	p=0.827	p=0.506
Conformation	0.641	-0.362	0.046	0.255	-0.226	0.057	0.137	0.597
	p=0.170	p=0.481	p=0.932	p=0.626	p=0.667	p=0.915	p=0.796	p=0.211
Walk	0.478	-0.063	0.170	0.074	-0.120	-0.033	-0.524	-0.297
	p=0.338	p=0.905	p=0.748	p=0.889	p=0.821	p=0.951	p=0.285	p=0.567
Trot	-0.090	-0.066	-0.089	0.059	0.494	0.274	-0.704	-0.430
	p=0.865	p=0.900	p=0.867	p=0.912	p=0.319	p=0.599	p=0.118	p=0.394
Overall impression	0.478	0.239	0.404	0.458	0.413	0.507	-0.524	-0.182
	p=0.338	p=0.648	p=0.427	p=0.360	p=0.415	p=0.305	p=0.285	p=0.731
General assessment	0.585	-0.057	0.232	0.331	-0.052	0.178	-0.288	-0.023
	p=0.223	p=0.914	p=0.658	p=0.522	p=0.922	p=0.736	p=0.579	p=0.965
Polanka								
Type	0.147	0.586*	0.702**	0.197	0.649*	0.790**	0.473	-0.062
	p=0.631	p=0.035	p=0.008	p=0.518	p=0.016	p=0.001	p=0.103	p=0.841
Conformation	0.186	0.460	0.587*	0.077	0.548	0.614*	0.497	0.152
	p=0.543	p=0.114	p=0.035	p=0.802	p=0.052	p=0.026	p=0.084	p=0.619
Walk	0.089	0.440	0.512	-0.178	0.178	0.073	0.342	0.406
	p=0.773	p=0.132	p=0.074	p=0.561	p=0.561	p=0.813	p=0.253	p=0.168
Trot	0.600*	-0.093	0.175	0.061	-0.206	-0.140	-0.028	0.341
	p=0.030	p=0.761	p=0.566	p=0.844	p=0.500	p=0.647	p=0.928	p=0.254
Overall impression	-0.232	0.736**	0.672*	-0.395	0.632*	0.392	0.609*	0.497
	p=0.446	p=0.004	p=0.012	p=0.181	p=0.020	p=0.185	p=0.027	p=0.084
General assessment	0.244	0.565*	0.721**	-0.196	0.536	0.438	0.726**	0.562*
	p=0.422	p=0.044	p=0.005	p=0.520	p=0.059	p=0.135	p=0.005	p=0.046

*difference statistically significant * at $P \leq 0.05$; ** at $P \leq 0.01$

Continuation of Table 3. Correlation between body conformation and Hucul horses movement and courage tests results

Trait	Walk			Trot			Test points	Test results
	Families	Steps length	Steps frequency	Rate	Steps length	Steps frequency		
Gurgul								
Type	-0.257	0.821*	0.709	0.600	0.431	0.583	-0.717	-0.384
	p=0.623	p=0.045	p=0.115	p=0.208	p=0.394	p=0.224	p=0.109	p=0.453
Conformation	-0.688	0.869*	0.503	0.700	0.074	0.249	-0.837*	-0.187
	p=0.130	p=0.025	p=0.309	p=0.121	p=0.890	p=0.634	p=0.037	p=0.722
Walk	0.809	-0.803	-0.374	-0.415	-0.052	-0.156	0.868*	0.153
	p=0.051	p=0.054	p=0.466	p=0.413	p=0.922	p=0.768	p=0.025	p=0.772
Trot	0.395	-0.900*	-0.721	-0.415	-0.496	-0.603	0.868*	0.140
	p=0.439	p=0.014	p=0.106	p=0.413	p=0.317	p=0.205	p=0.025	p=0.791
Overall impression	0.932**	-0.538	-0.021	-0.316	0.304	0.227	0.661	0.016
	p=0.007	p=0.271	p=0.969	p=0.541	p=0.558	p=0.666	p=0.153	p=0.977
General assessment	0.191	0.290	0.405	0.447	0.262	0.376	-0.134	-0.312
	p=0.717	p=0.577	p=0.425	p=0.374	p=0.615	p=0.463	p=0.801	p=0.548
foreign								
Type	0.029	0.860**	0.686	-0.246	0.402	0.205	-0.305	-0.314
	p=0.946	p=0.006	p=0.060	p=0.556	p=0.324	p=0.626	p=0.462	p=0.449
Conformation	0.100	0.719*	0.629	0.005	0.489	0.374	-0.347	-0.359
	p=0.814	p=0.044	p=0.095	p=0.991	p=0.218	p=0.362	p=0.400	p=0.383
Walk	0.695	-0.645	0.125	0.435	0.330	0.479	-0.089	0.056
	p=0.055	p=0.084	p=0.768	p=0.281	p=0.425	p=0.229	p=0.834	p=0.894
Trot	-0.187	-0.138	-0.271	-0.001	-0.259	-0.208	-0.594	-0.562
	p=0.657	p=0.745	p=0.516	p=0.998	p=0.536	p=0.622	p=0.120	p=0.147
Overall impression	0.789*	0.062	0.732*	0.503	0.901**	0.946**	-0.384	-0.253
	p=0.020	p=0.883	p=0.039	p=0.204	p=0.002	p=0.000	p=0.348	p=0.546
General assessment	0.643	0.454	0.916**	0.301	0.780*	0.752*	-0.597	-0.504
	p=0.086	p=0.259	p=0.001	p=0.469	p=0.022	p=0.031	p=0.118	p=0.203
general								
Type	0.032	0.221*	0.247*	0.122	0.173	0.230*	0.016	0.029
	p=0.755	p=0.029	p=0.015	p=0.232	p=0.090	p=0.024	p=0.878	p=0.780
Conformation	0.102	0.104	0.183	0.145	0.051	0.134	0.051	0.113
	p=0.321	p=0.311	p=0.072	p=0.156	p=0.619	p=0.191	p=0.622	p=0.271
Walk	0.546 **	-0.233*	0.120	0.153	0.009	0.115	0.057	0.138
	p=0.000	p=0.022	p=0.241	p=0.134	p=0.933	p=0.264	p=0.580	p=0.178
Trot	0.213*	-0.192	-0.046	0.191	-0.141	-0.050	-0.125	0.036
	p=0.036	p=0.059	p=0.655	p=0.373	p=0.169	p=0.625	p=0.222	p=0.727
Overall impression	0.212*	0.019	0.156	0.005	0.203*	0.184	0.167	0.088
	p=0.038	p=0.849	p=0.126	p=0.961	p=0.046	p=0.071	p=0.101	p=0.392
General assessment	0.267 **	-0.035	0.154	0.115	0.073	0.142	0.081	0.118
	p=0.008	p=0.737	p=0.132	p=0.264	p=0.479	p=0.165	p=0.430	p=0.249

*difference statistically significant * at $P \leq 0.05$; ** at $P \leq 0.01$

Discussion

The Hucul horse being a breed covered by the Genetic Resources Conservation Programme demands regular monitoring as regards its specific utility traits as well as affinity. Studies conducted till date concerned the characteristics of the breed (Krzemień and Kario, 1991; Brzeski et al., 1993; Purzyc, 2007,), biometric parameters (Brzeski and Kulisa, 1993; Kaproń and Pluta, 1993), and evaluation of movement (Brzeski et al., 1995). The breeding process is undertaken based on

procedures set in the Breeding programme (2007), which stipulates the need to preserve the lineage and families as well as retain a sufficient population size to avoid excessive in-breeding (Tomczyk-Wrona, 2010; Breeding Programme for Hucul breed of horses, 2007).

Researches concerning the assessment of indicators of movement conducted by Brzeski et al., (1995) for almost 20 years have demonstrated that intensive training could exert modifying impacts on the efficiency of basic paces. Indicators of length of steps in walk and trot were, moreover, much lower than those obtained in our studies. This clearly depicts changes in indicators of movement, typical though, taking place in the breed. Despite the fact that measurements undertaken in our studies covered only horses participating in courage utility tests, the twice longer step length observed seems rather too high. The afore-mentioned authors obtained step length in walk of 7.562 and 10.376 in trot during the loose horse saddle training. Indicators of step frequency in both walk and trot also differed significantly as results obtained from our studies were almost twice lower. Comparable results were only obtained for rate. In describing the biometric properties of Hucul's horses Brzeski and Kulisa (1993), it was demonstrated that values of primary measurements for draft utility and also based on calculated indexes have since 1938 shown increasing tendency. Purzyc (2009) has, on the other hand, drawn attention to the fact that feed profusion, management system, exploitation and feeding could result in slightly higher values of morphometric traits of horses reared in lowlands. This is a common phenomenon among primitive breeds, whose traits have been influenced by perennial adverse environmental conditions.

Particular attention is usually paid to the accuracy, propriety and efficiency of movement in horse breeding. It is also highly significant to relate these parameters with utility (Albertsdottir et al., 2007; Kaproń et al., 2006). Hucul horses have been classified as primitive breeds, whose traits have been crystallized by the natural environment (Krzemień and Kario, 1991; Purzyc, 2007). These horses are, currently, expected to show predisposition to work in light harness and saddled (Brzeski et al., 1995). It seems therefore appropriate to assess movement indicators during obligatory utility tests. In the course of our studies, only horses from the families of Wrona, Polanka and Gurgul demonstrated positive dependency between the values for body conformation and results from field trials. It can therefore be postulated that values for exterior assessment are weakly correlated with any eventual utility predisposition.

The rather large population of Hucul horses being bred in Poland, tested for courage, nominated to partake in elimination processes and for utility championships enables the qualitative assessment of lines and family traits to be carried out. It seems, therefore, necessary to draw up programmes that would make the real determination of horses' utility values possible while test of courage are being carried out.

References

- Albertsdóttir E., Eriksson S., Näsholm A., Strandberg E., Árnason Th. (2007). Genetic analysis of competition data on Icelandic horses. *Livestock Sci.*, 110, 242-250.
- Barrey E. (1999). Methods, applications and limitations of gait analysis in horses. *The Vet. Journal*, 157, 7-22.
- Brzeski E., Jackowski M., Łuszczynski J. (1995). Evaluation of movement of Hucul horses. Part III. Effect of training to harness and the saddle. *Zesz. Nauk. AR Kraków, Zoot.*, z.30, nr 297, s.95-103 (in Polish with English abstract).
- Brzeski E., Kulisa M. (1993). Biometric characteristic of the Hucul horses. *Zesz. Nauk. AR w Krakowie, Zootech.*, z..29, 83-90 (in Polish with English abstract).
- Brzeski E., Kulisa M., Jackowski M. (1993). The Hucul horses. *Zesz. Nauk. AR w Krakowie, Zootech.* Z.29, 9-15 (in Polish with English abstract).
- Kaproń M., Janczarek I., Suska A., Marchel I. (2006). Introductory research on relation between biometric rates of growing trotters and parameters of their movement capacity in initial training stage. *EJPAU*, 9 (1),art-28, (www.ejpau.media.pl/volume9/issue1/art-28.html).
- Kaproń M., Pluta M. (1993). Genetic determination of conformation traits in Hucul horse *Ann. Univ. M.Curie-Skłodowska, sectio EE*, 11, s. 157-161 (in Polish with English abstract).
- Krzemień M.P., Kario W. (1991). *Huculy–konie Połonin*. Parol Company Kraków (in Polish).
- Program hodowli koni rasy huculskiej. (2007). *Polski Związek Hodowców Koni*, Warszawa (in Polish).
- Purzyc H. (2007). A general characteristic of Hucul horses. *Acta Sci. Pol. Medicina Veterinaria*, 6(4), 25-31.
- Purzyc H. (2009). The evaluation of chosen Hucul horses morphometric traits with the use of point method. *Acta Sci. Pol.*, 8(2), 17-26.
- Tomczyk-Wrona I. (2010). *Genetic Resources Conservation Programme Hucul horses*. Instytut Zootechniki. Kraków (in Polish).