

Preliminary biometric characteristics of Greyster dogs

**Hieronim Frąckowiak¹, Mateusz Brylewski², Katarzyna Pęzińska-Kijak³,
Maciej Zdun^{1#}**

¹ Department of Basic and Preclinical Sciences, Institute of Veterinary Medicine, Nicolaus Copernicus University in Toruń, Lwowska 1, 87-100 Toruń, Poland

² Department of Animal Physiology, Biochemistry and Biostructure, Poznan University of Life Sciences, Wojska Polskiego 71C, 60-625 Poznań, Poland

³ West Pomeranian University of Technology in Szczecin, Department of Animal Anatomy and Zoology, Klemensa Janickiego 33, 71-270 Szczecin, Poland

SUMMARY

The aim of the study was to record and analyse selected biometric data based on the results of measurements of Greyster dogs actively involved in sports. The results were compared with the biometric indices of other dog breeds, including the original breeds from which Greysters are derived and Polish native breeds. The study showed that the Greysters are of intermediate height as compared with the original breeds they are derived from, i.e. shorter than Greyhounds and taller than German Shorthaired Pointers. Their height index was less than one, which means that the height at the withers was greater than the diagonal body length in the rectangular shape of the body. The chest girth was greater than the height at the withers, and the ratio of these values, expressed as the massiveness index, is similar to that of the Polish Greyhound. The Greyster eurysonia index (ratio of chest girth to diagonal body length) was also similar to that of the Polish Greyhound. The biometric parameters of Greysters allow them to run fast. This predisposition was also indicated by the leg length index and the proportions of the lengths of sections of the pelvic limb. Further research is necessary to determine all of the biometric characteristics of Greysters. The results obtained at this stage of research can be used as an auxiliary tool in selecting these animals for breeding or sport competitions. Any information with biometric data may be helpful in establishing a breed standard for Greyster dogs and classifying them as an FCI breed.

KEY WORDS: dogs, biometrics, Greyster

#Corresponding author e-mail: maciejzdun@umk.pl

Received: 02.06.2021

Received in revised form: 23.06.2021

Accepted: 24.06.2021

Published online: 30.06.2021

INTRODUCTION

For thousands of years dogs have not only accompanied humans, but served them as well. The long list of services that dogs provide to humans includes sport and recreation (Monkiewicz and Wajdzik, 2003). Dog sports have been described by Strychalski et al. (2016). Greysters (Fig. 1) are sled dogs bred by mating English Greyhounds with German Shorthaired Pointers; the name of the breed is a portmanteau of the names of the original breeds. In the Greyster genotype, 75% of the genes are derived from the German Shorthaired Pointer (FCI 119 standard) and the remaining 25% from the Greyhound (FCI 158 standard) (Szmurło, 2008). Greysters were originally bred in Norway in the 1980s. The most famous promoter and supporter of the Greyster breed is Lena Boysen-Hillestad, a recognised Norwegian breeder and a multiple European and world champion in sled dog racing. Greysters are distinguished by a lively temperament and low aggression, which are ideal characteristics for dog sled racing. At home they can remain calm and lie still for hours with no activity. However, they need to have a close bond with their owner, so that they will be fully engaged in pulling the sled during races. They require physical activity, including running, and tend to become hyperactive if the level of physical activity is insufficient. Dog teams pulling sleds in competitions often run 5-8 km, at an average speed of over 30 km/h. They can even run up to about 50 km/h. However, Greysters are not recognised as a breed by the International Canine Federation (FCI) because there is no official standard. When breeders select dogs for reproduction, they pay little attention to externally observable qualities, focusing mainly on utilitarian aspects. In consequence, there is very high diversity of external traits in the Greyster population. Greyster breeders analyse and meticulously complete the pedigrees of their dogs, as this is an essential source of information for selecting animals for breeding and for further genetic advances. In order to meet the potential expectations of breeders and dog sled racers, this study provides a record and analysis of selected biometric data acquired by measuring Greysters actively involved in sports. The results were compared with the biometric indices of other breeds, including the original breeds from which Greysters are derived and Polish dog breeds.



Fig. 1. Greyster; www.igortracz.com; photo used with the permission of Igor Tracz, world champion in sled dog racing and bikejoring)

MATERIALS AND METHODS

Greyster dogs actively participating in sled racing competitions were measured. All of the dogs were kept by Polish competitors and breeders. In total, 14 male and 14 female Greysters were measured. They were adult animals aged 2-6 years, fully grown and with fully developed skeletons. The following measurements were taken: chest girth, forearm and hand length (anterior autopodium), hind limb (pelvic limb) length, height at withers, and diagonal body length (Fig. 2). All measurements were taken while the dogs were standing.

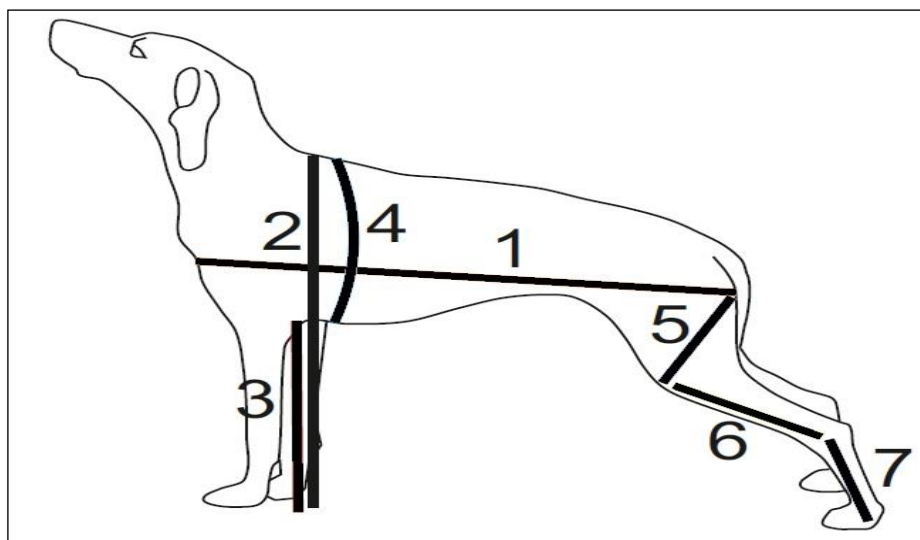


Fig. 2. Site of measurements: 1. diagonal body length 2. height at the withers 3. forelimb length 4. chest girth 5. thigh length 6. shank length 7. foot length

The chest girth was measured with a measuring tape, which was stretched between the withers and the sternal region (body of sternum) just behind the shoulder blades. Forelimb length was limited to the forearm and hand (anterior autopodium), measured from the ground to the anconeal process. Diagonal body length was measured from the humeral tuberosity to the ischial tuberosity. The length of the hind (pelvic) limb was divided into three partial measurements: from the ground to the calcaneal tuberosity, from the calcaneal tuberosity to the knee (apex of patella), and from the knee (apex of patella) to the ischial tuberosity. Zootechnical compasses and a measuring tape were used for the measurements. The dogs were measured in the presence of their owners, which helped to keep them calm.

The measurements were taken during the ESDRA European Championship, which took place in Christianslust, Germany, between 2 and 4 November 2012. The results of the measurements were analysed statistically – the mean, standard deviation and median were calculated, and the minimum and maximum values were given.

The following indices used in biometric research were calculated from the results of the measurements (Ściesiński, 2009, Horoszewicz et al., 2015):

- Body length index = $\frac{\text{diagonal body length}}{\text{height at withers}}$
- Massiveness index = $\frac{\text{chest girth}}{\text{height at withers}}$
- Eurysomia index = $\frac{\text{chest girth}}{\text{diagonal body length}}$
- Leg length index = $\frac{\text{forelimb length}}{\text{height at withers}}$

RESULTS AND DISCUSSION

Studies on dog biometrics conducted by Abramowska (1973), Ściesiński and Kaleta (1989), and Ściesiński (2002) were based on the measurement methodology proposed by Waszkowski (Abramowska, 1973). Fewer measurement data were collected and analysed in our study. Some other data were additionally used to show Greysters' anatomical suitability for fast running. The main focus was on the torso and chest measurements, the dogs' height, and especially the limb measurements, including individual parts of the pelvic limb. The skeleton and its joints and muscles, i.e. the entire motor apparatus of the pelvic limb, are particularly important for the motor activity of animals. The biometric characteristics collected in our study describe some dimensions and proportions of the animal's body (Table 1).

Table 1

The mean values of biometric measurements of Greysters

Trait/Measurement	Males		Females	
	\bar{x}	S	\bar{x}	S
Height at withers	69,92	4,6	64,85	2,5
Diagonal body length	68,57	5,0	63,57	2,4
Chest girth	77,50	6,4	72,36	3,9
Forelimb length	38,35	2,4	36,50	1,7
Thigh length	27,64	3,4	23,78	1,6
Shank length	28,64	1,4	27,21	1,3
Foot length	20,92	1,7	20,35	2,1

The Greysters' height at the withers was 64-80 cm (mean 69,92 cm) for males and 59-68 cm (mean 64,85 cm) for females. The heights at the withers of the original breeds from which Greyster dogs were bred are 71-76 cm for male and 68-71 cm for female English Greyhounds (FCI standard No. 158) and 62-66 cm for male and 58-63 cm for female German Shorthaired Pointers (FCI standard No. 119). Greysters are taller than German Shorthaired Pointers but shorter than Greyhounds, so that their height is intermediate as compared with the original breeds. By comparison, measurements of the native breed of Polish Greyhounds taken between 2017 and 2018 showed a mean height at the withers of 75,57 cm and 69,79 cm for females. In 1984 the mean height at the withers of these dogs was lower, i.e. 73,43 cm for males and 68,38 for females, and the differences were statistically

Preliminary biometric characteristics of Greyster dogs

significant (Firuta, 2019). Greysters are shorter than Polish Greyhounds and Tatra Shepherd Dogs, but their height at the withers is greater than that of Polish Hounds and Polish Hunting Dogs. Greysters are much taller at the withers than Polish Lowland Sheepdogs (Table 2), whose height is 45-50 cm for males and 42-47 cm for females (Ścieszński, 1997). Measurements of dogs by Krystek (data from 1984 cited by Ścieszński and Kaleta, 1989) resulted in similar values (47,50 cm).

Diagonal body length is another parameter describing the dog's body structure. It ranged from 62 to 81 cm (mean 68,57 cm) in the male Greysters and from 60 to 68 cm (mean 63,57 cm) in the females. The mean diagonal body length of Polish Greyhounds measured between 2017 and 2018 was 75,97 cm for males and 71,71 cm for females, whereas in 2009 it was 74,43 cm for males and 71,00 cm for females (Firuta, 2019). The diagonal body length of Greysters is smaller than that of Polish Greyhounds and Tatra Shepherd Dogs, but greater than that of Polish Hounds, Polish Hunting Dogs and Polish Lowland Sheepdogs (Table 2).

Table 2

Mean values of selected biometric measurements of Greysters (according to our study) and native Polish dog breeds (according to various authors)

Breed/type	Sex	Height at withers	Diagonal body length	Chest girth
Greyster (our study)	male	69,92	68,57	77,50
	female	64,85	63,57	72,36
Polish greyhound (Firuta 2019)	male	75,57	75,97	83,83
	female	69,79	71,71	78,59
Polish hound (Ścieszński 1997)	male	61,86	62,30	75,90
	female	59,30	61,90	73,50
Polish Hunting Dog (Ścieszński 1997)	male	57,60	57,20	69,60
	female	50,40	55,50	65,60
Tatra Shepherd Dog (Ścieszński 2007)	male	71,13	84,00	89,87
	female	65,87	78,19	78,37
Polish Lowland Sheepdog (Krystek 1984 cited by Ścieszński 2009)	male	47,50	49,33	64,07
	female	44,1	46,20	61,77

The body length index, i.e. the ratio of the diagonal body length to the height at the withers, was 98. This means that the silhouette of the Greyster dog could be inscribed in a rectangle (a silhouette that can be inscribed in a square results in an index of 100). The body length index of the Polish Greyhound is 10,2-10,3:10,0, i.e. the body length is slightly greater than the height at the withers (FCI Standard No. 333). The body length index of the Weimaraner, a hunting dog breed, is 12:10 (FCI Standard No. 99). This means that the diagonal body length is greater than the height at the withers. The Wirehaired Dachshund is an example of a breed with a completely different type of body structure. Its ratio of diagonal body length to height at the withers is 1,7:1 (FCI breed standard No. 148). The Greyster body length index differs slightly from the index of the Polish Hound, Polish

Hunting Dog, and Polish Lowland Sheepdog, and differs considerably from that of the Tatra Shepherd Dog (Table 3).

The Greyster chest girth ranged from 68 to 95 cm (mean 77,50 cm) in males and from 65 to 78 cm (mean 72,26 cm) in females. The wide spread of the Greyster chest girth shows a small degree of uniformity in the population, which is directly linked to the lack of a breed standard. The current mean chest girth of the Polish Greyhound is 83,83 cm for males and 78,59 cm for females.

Lower chest girth values have been recorded in previous measurements, i.e. 80,63 cm in males and 73,05 cm in females (Firuta, 2019). The Greyster mean chest girth was about 7,5 cm greater than the mean height at the withers. The Greyster chest girth was smaller than that of the Polish Greyhound and Tatra Shepherd Dog, but greater than that of the Polish Hound, Polish Hunting Dog, and Polish Lowland Sheepdog (Table 3).

Table 3

Indices of Greysters (according to our study) and native Polish dog breeds

Breed/type	Sex	Body length index	Massiveness index	Eurysomia index
Greyster (our study)	male	0,98	1,10	1,10
	female	0,98	1,11	1,11
Polish greyhound (Putko 1985 cited by Ściesiński (2009))	male	1,01	1,10	1,08
	female	1,03	1,07	1,03
Polish hound (Ściesiński 1997)	male	1,00	1,23	1,18
	female	1,04	1,24	1,19
Polish Hunting Dog (Ściesiński 1997)	male	0,98	1,20	1,22
	female	1,10	1,30	1,18
Tatra Shepherd Dog (Kucharska-Żądło cited by Ściesiński 2009)	male	1,18	1,26	1,07
	female	1,19	1,19	1,00
Polish Lowland Sheepdog (Krystek 1984 cited by Ściesiński 2009)	male	1,0381	1,3490	1,2995
	female	1,0476	1,4008	1,3371

The data cited indicate that the chest girth of the male and female Polish Greyhounds, Polish Hounds and Polish Hunting Dogs has decreased over the years. The eurysomia index (the ratio of chest girth to diagonal body length) of the Greysters of both sexes in the population analysed in our study was 1,11. This means that the chest girth was about 11% greater than the diagonal body length. Comparison with native Polish breeds showed that the Greyster eurysomia index was smaller than that of the Polish Hound, Polish Hunting Dog, and Polish Lowland Sheepdog, but greater than that of the Polish Greyhound and the Tatra Shepherd Dog (Table 3).

The Greysters' leg length index was 0,55 in the males and 0,56 in the females. This means that the females' forelimbs were proportionally longer than the males' forelimbs in relation to their height at the withers, although the average forelimb length was 36,50 cm in the females and 38,35 cm in the males. The forelimb length of the Tatra Shepherd Dog was 36,75 cm in males and 39,75 cm in

Preliminary biometric characteristics of Greyster dogs

females (Szmurło, 2008). According to the Middleasian Greyhound (Tazy) standard developed by Plakhov, the leg length index should be about 55. If it is below 53, it is classified as a deficiency, whereas a leg length index below 52 is classified as a defect (<http://www2.tulpar.pl>). The mean leg length index of Greysters of both sexes was similar to that of the Greyhound. This may indicate that Greyster dogs' are predisposed for running, which suggests that the trend to select for long forelimbs has proven successful. This limb structure allows Greysters to run at high average and maximum speeds and to move and change directions efficiently. The measurements of the pelvic limb were used to determine the proportions of its individual parts. The mean thigh, shank, and foot lengths were 26,64 cm, 28,64 cm, and 20,92 cm, respectively, in the males, and 23,78 cm, 27,21 cm, and 20,35 cm in the females. In both sexes, the shank had the greatest share in the total length of the pelvic limb, with a greater proportion in females: on average 37,09% for males and 38,13% for females. The foot had the smallest share in the total length of the pelvic limb in both sexes: on average 27,10% for males and 28,53% for females (Table 4).

Table 4

Mean lengths of individual sections of the Greyster pelvic limb, including their percentage share in the total length of the limb

Sex	Thigh		Shank		Foot		Total length	
	cm	%	cm	%	cm	%	cm	%
Male	27,64	35,80	28,64	37,09	20,93	27,10	77,20	100
Female	23,78	33,34	27,21	38,13	20,35	28,53	71,34	100

According to the standard for the Spanish Greyhound (FCI 285), a breed predisposed for galloping, the thigh length should be three quarters of the shank length (FCI breed standard No. 258). The thigh length to shank length ratio for Greysters is different than for Spanish Greyhounds. The mean ratio of the thigh length to the shank length was 96,5% for the male Greysters and 87,4% for the females.

Analysis of biometric measurements and indices provides breeders with objective information about the structure and proportions of animals' bodies. Specific biometric criteria are among the determinants of breed standards of dogs and other animals. Kobryńczuk and Borkowski (1999) showed that biometry is an important additional criterion in assessing the value of a dog breed.

An in-depth analysis of the results of biometric measurements of the population of Polish scent hounds resulted in the distinction of two separate breeds, the Polish Hound and the Polish Hunting Dog (Abramowska, 1973; Ściesiński and Kaleta, 1989; Ściesiński, 1997). Biometric analysis is a useful tool for tracking the changes occurring in a given population (such as a breed) over time (Abramowska, 1973; Brzeski and Kulisa, 1993; Redlicki, 1996; Cieśla et al., 2010; Firuta, 2019; Ściesiński and Kaleta, 1989; Ściesiński, 1997; Ściesiński, 2002). Horoszewicz et al. (2015) analysed the biometric indices of Siberian Huskies and observed statistically significant differences depending on sex and age. Purzyc et al. (2007) analysed some biometric indices of Hucul ponies to determine their body proportions and used them to distinguish utility types of these animals. By determining the proportions between measurements of specific parts of animals' bodies, e.g. the lengths of

individual limb segments, it is possible to predict their suitability for various uses, including sport competitions, as reported by Kaproń et al. (2000) and Komosa et al. (2013).

To sum up, the biometric measurements of the Greysters, the basic statistical analysis of the data and the calculation of indices provided objective information about these animals. As the population of dogs analysed in our study came from leading breeders and competitors participating in sled dog races, they can be assumed to be among the Greyster elite. The results of selected biometric measurements collected and analysed in our study has provided the first preliminary information about Greyster dogs. Greysters are of intermediate height as compared with the original breeds they are derived from, i.e. shorter than Greyhounds and taller than German Shorthaired Pointers, and their height index is less than one. This means that the height at the withers is greater than the diagonal body length in the rectangular shape of the Greyster body. The chest girth is greater than the height at the withers, and their ratio, expressed as the massiveness index, is similar to that of the Polish Greyhound. The Greyster's eurysonia index is also similar to that of the Polish Greyhound. The biometric parameters of Greysters allow them to run fast. This predisposition is also indicated by the leg length index and the proportions of the lengths of sections of the pelvic limb. Further research is necessary to obtain a complete set of biometric characteristics of Greysters. The results obtained at this stage of research can be used as an auxiliary tool in selecting these animals for breeding or for sport competitions. Any information with biometric data may be helpful in establishing a breed standard for Greyster dogs and classifying them as an FCI breed.

REFERENCES

1. Abramowska D. (1973). Z badań nad ogarem polskim. Zeszyty Naukowe Akademii Rolniczej w Warszawie, Zootechnika 9:107-117.
2. Brzeski E., Kulisa M. (1993). Charakterystyka biometryczna koni huculskich. Zeszyty Nauk. Akademii Rolniczej im. H. Kołłątaja w Krakowie. 283: 83-90.
3. Cieśla A., Ignor J., Fragstein – Niemdorff G. (2010). Analiza zmian w populacji koni fiordzkich w Polsce. Acta Scientiarum Polonorum, Zootechnika 9 (4): 57-62.
4. Firuta M. (2019). O chartach polskich w liczbach. Pies 03/375: 36-40. Praca magisterska, promotor: dr Magdalena Zatoń – Dąbrowska.
5. Horoszewicz E., Król M., Niedziółka R., Sweklej F. (2015). Preliminary analysis of biometria of Siberian Husky Dog. Acta Scientiarum Polonorum. Zootechnika 14 (2): 109-120.
6. Kaproń M., Janczarek J., Pluta J. (2000). Zależność między wskaźnikami pokrojowymi, a dzielnością wyścigową koni. Zeszyty Przeglądu Hodowlanego 50, 107-118.
7. Kobryńczuk F., Borkowski T. (1999). Biometria jako dodatkowe kryterium w ocenie wartości rasowej psa. Pies 4 (275): 4-5.
8. Komosa M., Frąckowiak H., Purzyc H., Wojnowska M., Gramacki A., Gramacki J. (2013). Differences in exterior conformation between primitive, Half-bred, and Thoroughbred horses: Anatomic-breeding approach. Journal of Animal Science 91, 1660-1668, doi: 10.2527/jas.2012-5367
9. Monkiewicz J., Wajdzik J. (2003). Kynologia. Wiedza o psie. Wydawnictwo Akademii Rolniczej we Wrocławiu, 561.
10. Purzyc H., Kobryn H., Komosa M., Bojarski J. (2007). Ocena eksterieru konia huculskiego na podstawie wybranych wskaźników morfometrycznych. Acta Scientiarum Polonorum Medicina Veterinaria 6, 49-64.

11. Redlicki M. (1996). PON Polski Owczarek Nizinny. Seria HOBBY „Fgros” Warszawa
12. Strychalski J., Gugolek A., Jastrzębska A. (2016). Psy w sporcie i rekreacji. Przegląd Hodowlany 3, 29-33.
13. Szmurło M. (2008). Hodowla hodowli nierówna Mój Pies 1, 48-49.
14. Ściesiński K., Kaleta T. (1989). Charakterystyka biometryczna polskich ras psów gończych. Przegląd Naukowej Literatury Zootechnicznej XXXV, 231-237.
15. Ściesiński K. (1997). Ogar Polski Gończy Polski Seria HOBBY „Egros” Warszawa.
16. Ściesiński K. (2002). Charakterystyka współczesnej populacji polskiego owczarka podhalańskiego. Cz.II. Przegląd Hodowlany 7, 20-25.
17. Ściesiński K. red. (2009). Polskie rasy psów. SGGW Warszawa.

Acknowledgements

The authors would like to thank Mr. Igor Tracz for his kindness and help and for permission to use the photo of the dog.