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Akhal-Teke as potential eventing horse in future

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Abstract

This study aimed to investigate the physical characteristics of Thoroughbreds and Akhal-Teke horses to assess the potential of Akhal-Tekes for use in eventing. Measurements of withers height, cannon bone circumference and chest girth were taken from 15 Akhal-Tekes and 17 Thoroughbreds of different age and sex while using standardized procedures to ensure accuracy and comparability. Thoroughbreds as well-known superb athletes and their dominance in eventing were used as a benchmark against which Akhal-Tekes were evaluated.

The results revealed that Akhal-Teke exhibit greater average withers height, while Thoroughbreds demonstrated larger cannon bone circumference and chest girth. These findings suggest that while Thoroughbreds possess a more robust frame, Akhal-Tekes may advantage in height and potential stride length, both of which are essential for eventing. The structural differences highlight complementary attributes in two compared breeds. With Akhal-Tekes demonstrating physical characteristics indicative of their suitability for eventing.

Absztrakt

Ennek a tanulmánynak az volt a célja, hogy megvizsgálja a telivér és az akhal-teke lovak fizikai jellemzőit, felmérje az akhal-teke versenyzésben való felhasználási lehetőségeit. A marmagasságot, az szárkörméretet és az övméretet 15 és 17 különböző korú és ivarú akhal-teke és angol telivértől vették, szabványos módon a pontosság és összehasonlíthatóság érdekében. A telivéreket, mint jól ismert kiváló, a lósportban is uralkodó lovakat használták viszonyítási alapként, amelyhez hasonlították az akhal-tekét. Az eredmények azt mutatták, hogy az akhal-teke nagyobb átlagos marmagasságot mutat, míg a telivérek nagyobb szárkörméretet és övméretet. Ezek az eredmények azt sugallják, hogy míg a telivérek robusztusabb rárával rendelkeznek, az akhal-teke előnyt jelenthet a magasságban és a lehetséges lépéshosszban, amelyek mindketten nélkülözhetetlenek a versenyzés során. A szerkezeti különbségek a tulajdonságok komplementaritására irányítják a figyelmet a két összehasonlított fajta vonatkozásában. Mindemellett, az akhal-teke a jelentős, versenyzésre való alkalmasságra utaló fizikai jellemzőket mutatja.

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1. Introduction

Equestrian triathlon, that is how eventing is commonly described in equestrian world. This complex Olympic sport is consisted of Dressage, Cross Country and Show jumping. 3-day Eventing truly puts horse and its rider on a test in all aspects of horsemanship.¹ In this modern era Warmbloods but predominantly Thoroughbreds are showing good performance in this discipline, search for perfect breed continues. But what about almost forgotten ancient breed, the Akhal-teke, that triumphed in almost all equestrian sports decades ago? Can the ‘Golden Horse’² be the best eventing horse in future?

In aim to try to answer these questions, this thesis will briefly go over the Eventing discipline, explore Thoroughbred breed as most used breed nowadays for eventing, explore Akhal-teke breed characteristic, also go over contributions of the most famous Akhals in the past. I will dive into comparison of two breeds according to our own research data on the body measurements of breeds, examining whether Akhal-tekas can be potential eventing horse compared to Thoroughbreds. By comparing traditional breed used for eventing to an Akhal-teke, this research aims to assess their compatibility and suitability based on conformation, temperament and finally trainability.

Through comparison of Akhal-teke and its contribution to equestrian sports, this study seeks to provide overall understanding of the, breed itself, ideal characteristics for Eventing horses and to potentially encourage expansion of the breeding pool for the future of the sport.

1.1. Eventing as discipline and its origins

3-Day Eventing or simpler Eventing is a comprehensive equestrian discipline. It contains three segments, Dressage, Cross country and Show jumping. Origins of eventing are coming from 19th century, precisely from military and fox hunting.³ Finally Eventing became an Olympic sport at the beginning of 20th century. ‘The purpose was to test the cavalry on their fitness and

¹ ‘A History of Eventing’.

² ‘НАУЧНЫЙ ЖУРНАЛ «IN SITU»’, 2024.

³ ‘Eventing’.

suitability (Figure 1). Dressage showcased skills from the parade ground, the jumping phases demonstrated speed and stamina.’⁴



Figure 1: 1936 Olympic three-day eventing, Captain Stubbendorf (GER) clears the difficult fascine ditch on Nurmi. Photo: IOC

1.2. The rules of eventing

Since Eventing is multiphasic discipline, each phase has its own rules. First phase is Dressage whose rules are described in ‘FEI Dressage Rules’ since same rules apply as for dressage as standalone equestrian discipline. In dressage riders with their horses perform a test (set of movements) and they are given marks (0-10) according to how well they perform these movements judged by numerous criteria. Penalty points are given in case if the errors. Trait that is mostly tested in horses in this segment is obedience of the horse. Next phase is of the Eventing is cross country. Aim in this phase is testing horse’s stamina, speed and jumping ability by correctly completing cross country course at shortest yet safe time without penalty points. Penalties are given for each second over the optimum time, for completing course in well under optimum time as well as in case of refusal or run out of jumping obstacles and for making a circle at an obstacle. Final phase of Eventing is Show jumping that test horse’s strength and jumping ability. In this phase of eventing aim is that rider with a horse completes jumping course with various obstacles in least amount of time without any penalty points, which are given for refusal, knocking down a pole, or exceeds the optimum time set for course.⁵

⁴ ‘A History of Eventing’.

⁵ ‘2024 FEI Eventing Rules_Clean Version.Pdf’.

1.3. Qualities for good eventer

Even though format of Eventing changed through the decades purpose stayed the same, testing full set of athletic traits in horses. We can conclude from previous section that qualities needed for this equestrian discipline that every successful eventing horse need to possess are stamina, fitness, strength, obedience, jumping ability and rideability.⁶ That why only few breeds can fulfil requirements to have successful carriers in eventing. There are no doubts that is why English Thoroughbred (Figure 2) is one of such breeds that is mostly used breed for Eventing nowadays, since it is one of the most athletic horse breeds on the planet.



Figure 2 Elisa Wallace and Simply Priceless aka Jonny (Thoroughbred). Photo by Nico Morgan.

⁶ ‘What Makes a Good Event Horse?’

2. Literature review

2.1. English Thoroughbred

2.1.1. Breed standard

‘The Thoroughbred breed remains synonymous with athletic traits.’⁷ was one of the first sentences in Annual report of International Stud committee. No doubts that careful selection of breeding prospects over the centuries created top notch athletes. Since this breed is synonym for athlete breeding is focused on reproducing horses with great athletic traits as speed and rideability, rather than phenotype. Afterall ‘the huge and lucrative multinational racing industry was built on the performance of this superb athlete.’⁸

2.1.2. Conformation

Even though the Thoroughbreds are known for their athletic ability, many aspects of the Thoroughbred’s appearance reflect their Arabian blood.⁹ This lighter breed has:

- A refined head with widely spaced eyes with large nostrils.
- Have slightly longer and lighter necks than other breeds¹⁰
- Prominent and well-defined withers¹¹
- Long, well-sloped shoulders.
- As in almost all athletic type horses, Thoroughbreds have a shorter and evenly curved backs.
- They typically have long but slimer body that aids them to achieve higher speed.
- Deep chest, muscular forelegs, especially shoulder area also aids them in higher speed achievement.
- They have great length from hip to hock¹² as well as well-developed hock joints. The upper hind leg should have long and strong muscles with a long thigh bone and wide hip angle for power.¹³
- Another characteristic of Thoroughbred is very strong quarters and loins for galloping.¹⁴enc

⁷ ‘The International Stud Book Committee’s Annual Report to All Approved Stud Books’.

⁸ Edwards, *The Horse Encyclopedia*.

⁹ Gilbert, Kellon, and VMD, ‘Thoroughbred Horse Breed’.

¹⁰ Gilbert, Kellon, and VMD.

¹¹ Gilbert, Kellon, and VMD.

¹² Brady, *America’s Horses and Ponies*.

¹³ Love et al., ‘Prevalence, Heritability and Significance of Musculoskeletal Conformational Traits in Thoroughbred Yearlings’.

¹⁴ Edwards, *The Horse Encyclopedia*.

- Their height at withers is 157-173 centimetres.¹⁵
 - Mane and tail of a Thoroughbred is very thin and fine. Tails usually falls little below hock while mane is pulled to be around 10 centimetres long.¹⁶
 - Underline of a Thoroughbred in most of the cases is drawn up when individual is in high intensity training.¹⁷
 - Gaskin is not usually crescent but flat and long.¹⁸
- Many eventing prospects slightly differ from racers, they stand taller, and they are also having slightly sloping croup to have better landing when jumping.¹⁹

2.1.3. Coat colours

Thoroughbreds are characterized by wide colour pallet with numerous solid colours as bay, chestnut, black, brown and gray. Beside previously mentioned colours we can observe palominos, buckskins and roans²⁰ according to the Marvellous O. Oyebanjo in a ‘Genes affecting coat colour and the resulting variation in horses (*Equus caballus*) – A Review’. ‘Sadly the ‘deadly’ overo colour O allele can also be found in Thoroughbreds, even though it is extremely unusual.’²¹

2.1.4. Movement

Thoroughbreds are bred to run. Since they are mostly bred and used for gallop races their trot is usually uncomfortable and walk is lacking in polish.²²Thoroughbreds are characterized by their long, low, and economical stride.²³ As always, without exception in this case this can be individual as well that Thoroughbreds because of their uncomfortable slower gaits is generally poor riding horse. ²⁴ On the other hand, it is an outstanding jumper and hunter²⁵ which makes it clearly noticeable breed for eventing.

¹⁵ Edwards.

¹⁶ Brady, *America's Horses and Ponies*.

¹⁷ Brady.

¹⁸ Brady.

¹⁹ Brady.

²⁰ Oyebanjo, Obi, and Salako, ‘Genes Affecting Coat Colour and the Resulting Variation in Horses (*Equus Caballus*) – A Review’.

²¹ Oyebanjo, Obi, and Salako.

²² Brady, *America's Horses and Ponies*.

²³ Edwards, *The Horse Encyclopaedia*.

²⁴ Brady, *America's Horses and Ponies*.

²⁵ Brady.

2.1.5. Temperament

Thoroughbreds are breed known for their distinctive personalities that can significantly among individuals.²⁶ Since they are mostly bred for racing, they are characterized with a high-spirited and sensitive temperament. They can be highly strung, but possess great physical stamina as well as courage, battling on when other horses would have given up.²⁷ With aim to develop perfect sport horses many breeding programs and close breeding develop a high-strung animal.²⁸ Genetics is not stand-alone culprit for such a temperament. Lifestyle of these horses, high intensity training and nutrition also can contribute to the nervousness of these animals. As it is stated in ‘America’s horses and ponies’ by Brady Irene ‘Those that have been used in other fields, such as riding, hunting, or jumping, may never be especially nervous at all.’²⁹

2.2. Akhal-Teke

2.2.1. History of Akhal-Teke

The Akhal-teke is one of the oldest breeds on the Earth. Ancestors of an Akhal-Teke is believed to be a Nissen horse, however tracing their exact ancestry is difficult since horses weren’t classified as specific breeds before 1600 AD but instead grouped by local types.³⁰ Their history goes back more than 3,000 years. This means that people have been carefully breeding and raising these horses for an incredibly long time, longer than most other horse breeds. This ancient breed is coming from area of Central Asia, more precisely from southern region of today’s Turkmenistan, the Turkmen region.³¹ They were named after Teke tribe, nomadic tribe that was well known for their outstanding skills in horsemanship. Due to tribe’s constant need to move, they needed horses that could bare harsh conditions while traveling long distances. These horses were not only strong and enduring, but they were used as working horses as well as war horses.³²

2.2.2. History of Akhal-Teke in equestrian sports

Even though this breed is considered as ‘Threatened’ according to the Livestock Conservancy it had numerous famous sport prospects in the past.

²⁶ Dan, ‘Thoroughbreds Horse Breed | Comprehensive Insight into a Thoroughbred » Horsepedia’.

²⁷ Edwards, *The Horse Encyclopaedia*.

²⁸ Brady, *America’s Horses and Ponies*.

²⁹ Brady.

³⁰ ‘About the Akhal-Teke Breed’.

³¹ ‘Akhal-Teke Horses | Oklahoma State University’.

³² Carroll, ‘Pedigree and Inbreeding Analysis of Rare and Endangered Akhal-Teke Horse’.

- Absent

- One of the most famous Akhal-Teke horse in history, truly magnificent black stallion with four white socks. Absent gained a worldwide fame for his outstanding performance in dressage. With his rider Sergei Filatov (Figure 3) from Soviet Union, they won gold medal in Prix de Dressage at 1960 Summer Olympics held in Rome. They continued to shine by winning an Individual Bronze medal at the 1964 Summer Olympics in Tokyo. Absent's success didn't come out of nowhere, he had highly impressive lineage. His sire, Arab 28 had successful carrier as a show jumper.³³ This shows that Akhal-Teke breed is not only special for their beautiful metallic coat and endurance but also for its talent in competitive equestrian sports.

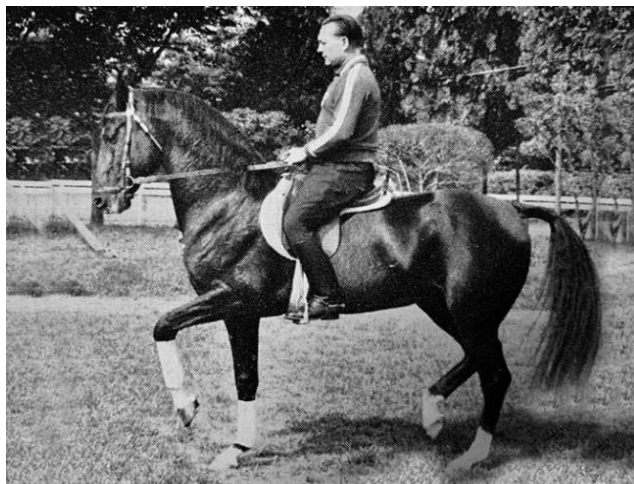


Figure 3 Sergei Filatov on Absent

- Poligon

- An exceptional Akhal-Teke specimen that held a record for high-jumping in Soviet Union for many years. This horse amazed everyone by clearing 212centimeter high obstacle³⁴, showing this breed's true strength and athleticism. Since Poligon's achievement stayed unmatched for a long time it is truly making him a symbol of Akhal-Teke potential in equestrian sports.

- Perepel

- In 1950, this amazing horse set a record in board jumping. He jumped an incredible distance of 8 meters and 78 centimetres.³⁵

³³ 'Akhal-Teke in Sport'.

³⁴ 'Characteristic – Ópusztaszeri Akhal Teke Ménes'.

³⁵ 'Characteristic – Ópusztaszeri Akhal Teke Ménes'.

- **Kambar**
 - This racehorse became famous for his outstanding performance in flat track. Out of the 64 races that he competed in, he won 63 of them.³⁶ This achievement speaks to the incredible speed and determination of his breed. His nearly perfect record made him a true legend in the equestrian history.
- **Kaplan**
 - Another extremely talented racehorse that has shown the true qualities of Akhal-Teke breed to the racing world. Kaplan ran races ranging 1400 to 4000 meters and out of the 26 events he finished first at 16 of them.³⁷
- **Magdan (Karakir)**
 - Magdan also known as Karakir was an endurance horse that placed second during the 1952 Championships of Middle Asian Republics held in Kazakhstan. He ran 50-kilometer race in only 1 hour, 30 minutes and 51 seconds.³⁸ This horse was a proof that Akhal-Tekes have outstanding stamina and determination when going long distance.
- **Akbar**
 - This incredible endurance horse triumphed in the 10,000-meter race held in Tashkent. He completed the race with easily said impressive time of 14 minutes and 14,8 seconds.³⁹ His outstanding performance showcased not only speed and endurance, but ability to stand out in endurance competitions.
- **Kandar**
 - This Akhal-Teke gelding achieved outstanding success in Eventing. In 1998 he was named the UESF Horse of the Year at the Intermediate level and earned title of Zone Champion. In the 2000, Kandar was long listed for Sydney Olympic Games with his rider Karen Yates.⁴⁰ These accomplishments are proving this breed's excellence in high-level competition.

2.2.3. Breed standard

The Akhal-Teke is extraordinarily beautiful and unique horse breed that stands out for its athleticism, elegance and endurance. Its refined appearance is often, quite accurately compared

³⁶ 'Characteristic – Ópusztaszeri Akhal Teke Ménes'.

³⁷ 'Characteristic – Ópusztaszeri Akhal Teke Ménes'.

³⁸ 'Characteristic – Ópusztaszeri Akhal Teke Ménes'.

³⁹ 'Characteristic – Ópusztaszeri Akhal Teke Ménes'.

⁴⁰ 'Akhal-Tekes in Sports and as Working Partners – Akhal-Teke Association of America'.

to animals like cheetah or a greyhound because of its slender body and graceful movements.⁴¹ These comparisons show how special this breed really is. When Akhals are judged and graded, first thing that judges look for is good health and physical soundness⁴², which means the individuals should be in good condition and strong. After that, they focus on characteristics that define the breed or so called specific 'type'.⁴³

2.2.4. Breeding lines

In this horse breed, as in several others, different types among the breed are described. Choice of a type depends on the plan and goals that rider has. Breeding lines of Akhal-Tekese are based on parental lineages. This breed traces its lineages back to four key sires. Boinou that was the source of 12 major bloodlines. Tshoparkel whose line is unrelated to the other and represents the old Akhal-Teke type. Kutlisakar common ancestor shared with Boinou, that was also linked to 4 additional lines. Akbelek that is known for its racing abilities.⁴⁴ Not all Akhal-Tekes are suitable for every discipline, for example horse bred for eventing may not perform well in shows. There are 4 main types of Akhal-Tekes:

- The War Horse (Alman At) – Even though this type is extremely rare today with only about 80 left, it is original type of this breed. These horses are divided into light, medium and heavy builds. They are evenly built, with a strong back, medium-length body, muscular neck and excellent hooves. They are mostly suited for endurance and hunting. Bloodlines notable for this type are Dor Bairam, Kir Sakar, Sapar Khan Toporbai and Ak Sakal.⁴⁵
- The Racehorse (Toi At) – As name says it, these horses are bred for racing. With their long lines, straight backs, long necks, slim legs and wide nostrils are ideal for racing and jumping. Famous bloodlines include Posman, Fakirpelvan, El and Kaplan.⁴⁵
- The Sport Horse – This type of Akhals resembles western breeds like Trakehners or Anglo-Arabs. They have more muscular body which is perfect for dressage and eventing. Well-known bloodlines for this type are Arab, Gelishikli, Skak and Peren.⁴⁵

⁴¹ 'Breed Standard – Akhal-Teke Association of America'.

⁴² 'Breed Standard – Akhal-Teke Association of America'.

⁴³ 'Breed Standard – Akhal-Teke Association of America'.

⁴⁴ 'Studfarm d` Akhal, France, Akhal-Teke Horses - Lines'.

⁴⁵ 'Studfarm d` Akhal, France, Akhal-Teke Horses - Lines'.

- The Show Horse – Last but not least this type of Akhal-tekas are known for their elegance and very elongated lines. One more characteristic of this line is so called ‘gooseneck’ neck. Bloodlines for this type are Everdi, Peren, Kaplan, Gelishiki and Teleke.⁴⁵

2.2.5. Body conformation

The Akhal-Teke should demonstrate elegance, stamina and athleticism. Main outline concerning conformation according to Akhal-Teke Association of America is:

- Long, narrow head with length mostly between eyes and muzzle.
- Large nostrils, thin lips and ‘oriental’-shaped eyes.
- Long and slim ears.
- Slim flexible neck set high on shoulder with a refined throatlatch.
- These horses are considered as medium-sized horses⁴⁶, standing around 150-163 centimetres.⁴⁷
- Long and strong back with a level topline.
- Akhal-Tekes have prominent withers, sloped shoulders and wide hip angle.
- Another characteristic of these horses is that they have narrow chest from the front with a deep heart girth.
- Akhals should have thin skin, fine coat and often sparse mane, tail and forelock.
- Metallic shine in coat is desirable.⁴⁸
- They give overall impression of athleticism with lean, refined musculature.⁴⁹
- This horse is characterized by dense bones and large flat joints to aid their stamina and hardiness made for desert life.⁴⁹
- Their cannon bones are short, and their hocks set low.⁴⁹
- Long forearm and gaskins that are muscled smoothly, with well-defined tendons.⁴⁹
- Long pasterns angled consistently with hooves and shoulders.⁴⁹
- Hooves of this breed are smaller compared to the other breeds with similar characteristics, which are additionally round and extremely hard.⁴⁹

⁴⁶ ‘Breed Standard – Akhal-Teke Association of America’.

⁴⁷ Edwards, *The Horse Encyclopedia*.

⁴⁸ ‘Breed Standard – Akhal-Teke Association of America’.

⁴⁹ ‘Breed Standard – Akhal-Teke Association of America’.

2.2.6. Coat Colours

Wide range of colours along with their metallic shine is one of the most recognizable characteristics of this breed. The colour range of Akhal-Teke varies from basic domesticated colours as bay (genotype A-E-), black (genotype aa E-), chestnut (genotype A-ee) and seal brown which genotype is not specified yet.⁵⁰ Beside basic colours Akhal-Teke can possess cream gene (Ccr), that dilute bay into buckskin and chestnut into palomino. In case of black and red homozygous individuals that possess cream gene basic colours are diluted to cremello colour.⁵⁰ It is not uncommon that we can observe grey individuals of this magnificent breed. They can have dominant grey gene (G) in their genome that need only one copy to fade any colour into a grey colour.⁵¹ Marking wise, white markings can be present in this breed and approved by studbooks.⁵¹

2.2.7. Movement

Beside four basic gates, the walk, trot, canter and gallop of this breed these horses 'have a unique action: it seems to slide over the ground in a flowing movement without swinging its body'⁵² Recent study, done at Mississippi State University and supplied by The Livestock Conservancy that was an analysed video study in which videotaped Akhal-Tekes were performing the trot. It was published at Akhal-Teke Association of America that after the gait analysis research reported that instead of two-beat trot, Akhals 'steps down individually with each hoof alternating between periods of a single limb supporting the body to two limbs, the diagonal limbs, supporting the body. While the gait has a diagonal footfall sequence (left hind-right fore-right hind-left fore) similar to the basic trot, by disassociating the diagonal pairs the gait loses a period of suspension, and thus, making the gait less concussive.'⁵³ Conclusively this type of 'gliding gait' would result in more comfortable ride for both rider and the horse.⁵³

2.2.8. Temperament

These horses are very often described as temperamental, curious and efficient.⁵⁴ They are known for being energetic, smart and sensitive horses. Even though they are quick learners, they have independent personality and react strongly to their surroundings. Typically they form close bond with their riders and are loyal partners. Their spirited nature comes from their history

⁵⁰ 'KaraKum Akhal-Tekes - The Akhal-Teke Colors'.

⁵¹ 'Breed Colors – Akhal-Teke Association of America'.

⁵² Edwards, *The Horse Encyclopedia*.

⁵³ 'Akhal-Teke Gait Study – Akhal-Teke Association of America'.

⁵⁴ 'НАУЧНЫЙ ЭЛЕКТРОННЫЙ ЖУРНАЛ «АКАДЕМИЧЕСКАЯ ПУБЛИЦИСТИКА»'.

of surviving in tough conditions.⁵⁵ In conclusion this breeds combination of intelligence, sensitivity and spirit makes it a remarkable yet demanding breed.

2.2.9. Muscle Composition of Akhal-Teke horses

The results of a study published by Cambridge University Press in 2010 that was examining myosin heavy chain (MyHC) isoform composition in gluteus medius muscle of Akhal-Tekes suggest that this breed has remarkable combination of muscle traits. Muscles of these horses are suited for both endurance and speed. Using SDS-PAGE analysis, researchers observed that muscles of these horses have the MyHC IIx isoform, associated with fast-twitch muscle fibres a bit over the 50% of total MyHC content. On the other hand, MyHC IIa isoform that is linked to a balance of speed and endurance, accounted about 38%, while the MyHC I isoform that supports sustained activity numbered almost 12% on average. These three finding indicate that Akhal-Teke horses possess a muscular composition capable of excelling in disciplines requiring both power and stamina⁵⁶ such as eventing. This adaptability of Akhal-Teke muscles aligns with hypothesis that this breed could suite well for wide range of equestrian disciplines.

⁵⁵ 'НАУЧНЫЙ ЖУРНАЛ «IN SITU»', 2024.

⁵⁶ Leisson et al., 'Myosin Heavy Chain Pattern in the Akhal-Teke Horses'.

3. Materials and Methods

In this study in aim to compare Thoroughbred horses as a breed that is most used for Eventing to a Akhal-Teke horses as potential breed to be used for this purpose we have taken morphological measurements of these two breeds. Study was conducted in December 2023.

3.1. Study Population

3.1.1. Akhal-Teke population

This study included in total 15 Akhal-Teke horses. Out of 15 analysed horses 10 were mares and 5 stallions. The ages ranged from 2.5 to 12 years. On a day of measurement, out of measured population, some individuals were actively engaged in breeding programs while others were in training. All individuals are horses from SI Akhal Stud farm located in Tata Agostyán, Hungary (Figure 4). Measuring of horses was conducted on December 2nd, 2023.

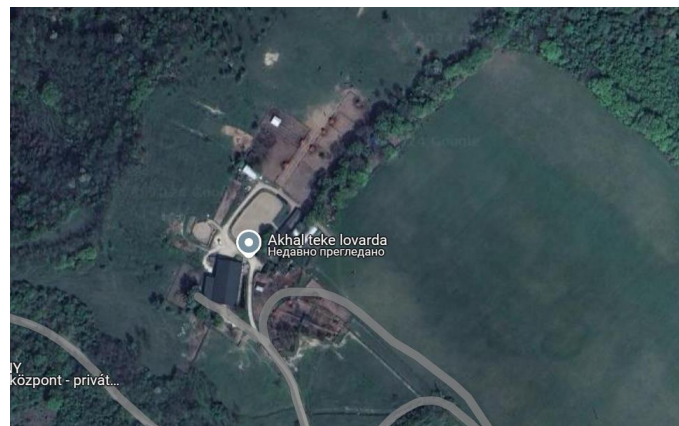


Figure 4 Cartographic view of SI Stud Farm in Tata Agostyán.

3.1.2. Thoroughbred population

In total 17 Thoroughbred horses were involved in this study. From total number of measured horses 4 were stallions and 13 were mares. Age range of Thoroughbred population examined in this study is from 6 to 14 years. All individuals of this population were actively used in breeding. Horses used in this study are from Dióspuszta Stud Farm as part of Bábolna National Stud farm located in Diós puszta next to Tata, Hungary (Figure 5). This population underwent measurement on December 16th, 2023.



Figure 5 Cartographic view of Dióspuszta Stud Farm in Diós puszta, Hungary.

3.2. Body measurements

In this study we have measured:

Withers height – Given the fact that taller horses are known to perform better at higher level of eventing, it was essential to measure and compare the height of these two breeds.

Chest girth – As an indicator for horse's strength and stamina which are essential for each eventing sport horse.

Cannon bone circumference – This morphological measurement serves as a key indicator of bone strength and load bearing capacity, which are critical for the physical demands of eventing.

Side photograph of a full horse – in aim to evaluate and compare overall conformation of these two breeds.

3.3. Measurement equipment

For this study, a flexible measuring tape (Figure 8) was used to measure the cannon bone circumference, allowing precise measurements around the curved surface of the bone. For chest girth, a special horse measuring tape was utilized (Figure 6), designed specifically for equine body measurements. Withers height was measured using livestock measuring stick (Figure 7), that provided standardized height data. Additionally, photographs were taken using a smartphone to document horses and support the measurements.



Figure 6 Horse measuring tape



Figure 7 Livestock measuring stick



Figure 8 Soft measuring tape

3.4. Measurement procedure

The measurement procedures in this study were standardized to ensure accuracy across all horses. All measurements were conducted while the horses stood squarely on flat, level surface and handled by experienced stableman to minimize movement and ensure proper positioning. All measurements were documented in centimetres for uniformity of sample pool.

The withers height was measured using livestock measuring stick. The stick was placed perpendicular to the ground, with the measuring arm aligned at the highest point of the withers (Figure 9, a-b). For chest girth measurement, soft horse measuring tape was used. Tape was wrapped around the thorax, positioned at girth groove on the ventral side and aligned across the withers on the dorsal side (Figure 9, c-d). The cannon bone circumference was measured using soft measuring tape. The tape was wrapped around the cannon bone of the left front leg, just below the carpus in aim to ensure consistent and reliable reading. (Figure 9, R-Q)

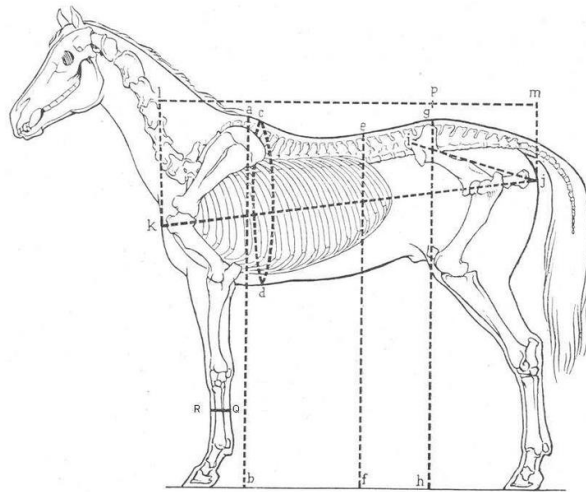


Figure 9 Recording body measurements on horse (Schandl, 1955)

4. Results

4.1. Results of withers height

The withers height of measured horses was analysed to compare physical structure of Thoroughbreds and Akhal-Tekes, given the importance of height for good performance in higher-level eventing. Taller horses often perform better in this sport due to their stride length and jumping ability needed for this discipline.

The average withers height of Thoroughbreds was found to be 158.85 (Table 3) centimetres, with a range from 152cm to 167cm (Table 2). In comparison, the Akhal-Teke horses had an average height of 161.37 centimetres (Table 3), with a minimum height of 155cm and maximum of 168.5cm (Table 1).

Table 1: Withers height values for Akhal-Teke horses

Name of horse	Age (years)	Sex	Withers height (cm)
Bugatti	12	Mare	156.5
Borostyan	3.5	Mare	155
Uni-Gaia	3.5	Mare	163
Ferhö	3.5	Mare	156.5
Uniqua	4.5	Mare	164.5
Al Jaira	4.5	Mare	162.5
Opera	9	Mare	161
Filegia	11	Mare	161.5
Agunda	9	Mare	163
Aranyalma	2.5	Mare	157
Aldas	8	Stallion	168.5
Rahl	3.5	Stallion	167.5
Delceg	6	Stallion	165
Orkan	8	Stallion	159.5
Aspanjar	11	Stallion	159.5

Table 2: Withers height values for Thoroughbred horses

Name of horse	Age (years)	Sex	Withers height (cm)
Aeronwy Thomas (IRE)	12	Mare	152
Miss Brooch (GER)	11	Mare	162
Messerschmitt	9	Mare	162
Persi	11	Mare	163
This Girl	9	Mare	166
Carina	7	Mare	153
Sainted	10	Mare	155
Muffin	9	Mare	154
Spice Of Life	7	Mare	155
Innocent	7	Mare	156
Alternanthera (GB)	9	Mare	161
Ancient Longing	9	Mare	162.5
Mokarris	8	Stallion	155
Pigeon Catcher	14	Stallion	167
Ecrivain	6	Stallion	164
Cirfandli	8	Stallion	160
Morning Chimes	9	Mare	153

Table 3: Statistical data of withers height of two breeds

Group	Akhal-Teke	Thoroughbred
Mean	161.367	158.853
SD	4.073	4.949
SEM	1.052	1.200
N	15	17
Variance	16.588	24.493

The results show that Akhal-Tekes generally have slightly taller average height compared to Thoroughbreds. Interestingly, the Akhal-Tekes measured in this study showed less variation (Table 3) in wither height, which may indicate a more uniform phenotype across the population even though the age variation of Akhal-Teke population was grater. Contrary the Thoroughbreds measured exhibited slightly greater variability (Table 3) which could reflect their breeding for various equestrian disciplines.

4.2. Results of cannon bone circumference

The cannon bone circumference of measured horses was analysed as an indicator of strength and load-bearing capacity. This parameter reflects the structural soundness and durability of the limb.

Table 4: Canon bone circumference values for Akhal-Teke horses

Name of horse	Cannon bone circumference (cm)
Bugatti	18
Borostyan	18
Uni-Gaia	18
Ferhö	18
Uniqua	18
Al Jaira	18.5
Opera	19
Filegia	19
Agunda	18.5
Aranyalma	18
Aldas	20
Rahl	19
Delceg	19
Orkan	19
Aspanjar	19

Table 5: Cannon bone circumference values for Thoroughbred horses

Name of horse	Cannon bone circumference (cm)
Aeronwy Thomas (IRE)	19.5
Miss Brooch (GER)	20
Messerschmitt	19.5
Persi	20.5
This Girl	21
Carina	20
Sainted	20
Muffin	20
Spice Of Life	20.5
Innocent	20
Alternanthera (GB)	21
Ancient Longing	21
Mokarris	20.5
Pigeon Catcher	20
Ecrivain	20
Cirfandli	20.5
Morning Chimes	19.5

Table 6: Statistical data of cannon bone circumference of two breeds

Group	Akhal-Teke	Thoroughbred
Mean	18.600	20.206
SD	0.604	0.502
SEM	0.156	0.122
N	15	17
Variance	0.364	0.252

The average cannon bone circumference for Thoroughbreds was 20.2 cm (Table 6), with measurements ranging from 19.5 to 21 cm (Table 5). In contrast to Thoroughbreds, the Akhal-

Teke horses had an average circumference of 18.6 cm (Table 6), with 18 to 20 cm range (Table 4).

The results indicate that in Akhal-Tekes slightly slimmer cannon bones are observed compared to Thoroughbreds. These findings show that while Thoroughbreds have traditionally been bred with specific conformation suited for eventing, Akhal-Tekes show potential in terms of limb strength since there is only a slight difference between finding in these two populations.

4.3. Results of chest girth

The chest girth is a critical parameter for eventing since it it can influence the horse's respiratory efficiency and overall stamina.

Table 7: Chest girth values for Akhal-Teke horses

Name of horse	Chest girth (cm)
Bugatti	179.5
Borostyan	162
Uni-Gaia	170
Ferhö	158
Uniqua	182
Al Jaira	180
Opera	181
Filegia	181
Agunda	186
Aranyalma	170
Aldas	178
Rahl	178
Delceg	176
Orkan	171
Aspanjar	170

Table 8: Chest girth values for Thoroughbred horses

Name of horse	Chest girth (cm)
Aeronwy Thomas (IRE)	198
Miss Brooch (GER)	200
Messerschmitt	192
Persi	200
This Girl	196
Carina	196
Sainted	199
Muffin	191
Spice Of Life	192
Innocent	192
Alternanthera (GB)	203
Ancient Longing	202
Mokarris	192
Pigeon Catcher	224
Ecrivain	192
Cirfandli	190
Morning Chimes	198

Table 9: Statistical values of chest girth of two breeds

Group	Akhal-Teke	Thoroughbred
Mean	174.833	197.471
SD	7.814	7.993
SEM	2.018	1.939
N	15	17
Variance	61.06	63.89

The chest girth measurements of Thoroughbred horses ranged from 190cm to 224cm (Table 8) with an average value of 197.47cm (Table 9). In comparison, the Akhal-Teke horses had a chest

girth measurement ranging from 158cm to 186cm (Table 7), with an average of 174.83cm (Table 9). These findings suggest that Thoroughbreds have bigger thorax with consequently better predisposition for higher respiratory capacity, though it must be considered that age average of these two groups is not the same. Age average of examined Thoroughbreds was higher than in Akhal-Teke which can impact the chest girth as well as the fact that all measured Thoroughbreds were actively involved in breeding program.

4.4. Conformational differences and similarities

This section aims to present a visual comparison of the overall conformation of Akhal-Teke and Thoroughbred horses. Conformation can significantly put the impact on the horse's performance, health and suitability for various disciplines, including eventing. Out of whole sample pool we have took out two breeding stallion (Figure 10 and Figure 13) and two broodmare (Figure 11 and Figure 12) samples of each breed for comparison.

4.4.1. Akhal-Teke horse conformation



Figure 10: Buggati 12 years old palomino mare (on the left) and Opera 9 years old bay mare (on the right)



Figure 11: Orkan 8 years old perlino stallion (left) and Aldas 8 years old gold buckskin stallion (right)

4.4.2. Thoroughbred horse conformation



Figure 12: Sainted 10 years old chestnut mare (left) and Persi 11 years old grey mare (right)



Figure 13: Pigeon Catcher 14 years old chestnut stallion (left) and Ecrivain 6 years old chestnut stallion (right)

From the photos above (Figure 10, Figure 11, Figure 12, Figure 13) we can conclude that these two breeds have similar body conformation yet there are some differences.

4.4.3. Similarities of two breeds:

- We can notice that both breeds have long, well-built legs with strong tendons.
- Medium to long pasterns are greatly similar in both breeds.
- Both Akhal-Teke and Thoroughbred are characterized by sloping shoulders.
- Prominent, well-defined withers can be observed in both breeds with continuation of long necks.
- Both breeds have deep chest, symmetrical back, and similar body proportions.

4.4.4. Differences

- We could observe that Akhal-Tekes have more elegant, streamlined body proportions than Thoroughbreds.
- Akhal-Tekes tend to have longer back than Thoroughbreds as well as narrower frame that gives more angular appearance.
- Less body fat can be observed in case of Akhal-Tekes compared to Thoroughbreds.
- Even though both breeds are considered to have refined head, Thoroughbreds tend to have slightly larger head with a straight profile.
- We have already noted that both breeds have long necks, but Akhal-Teke's necks tend to be slenderer and more arched.
- Coat of Akhal-Teke noticeably have metallic sheen in comparison to Thoroughbreds.
- Hooves of these two breeds also differ from each other, Akhal-Tekes clearly have smaller and more upright hooves in compared to their body than Thoroughbreds.

5. Conclusion

This study aimed to compare physical characteristics of Akhal-Tekes and Thoroughbreds, specifically focusing on body conformation, wither height, cannon bone circumference and chest girth to test the hypothesis that Akhal-Teke horses could be used for eventing. The results demonstrated that Akhals tend to have greater height, Thoroughbreds showed slightly bigger cannon bone circumference and chest girth. Similar findings in both breeds indicate that both breeds have structural soundness and endurance potential which are crucial to succeed in eventing disciplines.

Findings of this study suggest that Akhal-Teke, breed which is known for stamina and agility, possess the physical attributes necessary for eventing. Their perfect height with sufficient cannon bone strength and deep thorax, can position them as a potential alternative to Thoroughbreds in equestrian sports. This supports the hypothesis that Akhals can be effectively used in eventing and expand scope of use beyond endurance and historical roles.

These results add to an expanding collection of studies advocating for the versatility of Akhal-Tekes. However, further studies investigating additional traits such as stride length, jumping ability, temperament under competition conditions as well as studies with greater sample pools could be extremely valuable to confirm their suitability at higher levels of eventing. By exploring these fields, this research could provide foundation for more evidence-based breeding and training practices designed to optimize the performance of Akhal-Tekes in competitive equestrian disciplines such as eventing.

6. Summary

This study explores physical characteristics of Thoroughbred and Akhal-Teke horses to evaluate Akhal-Teke's potential for eventing, an equestrian discipline that demands combination of strength, endurance and agility. To provide comprehensive foundation, the study includes literature review describing eventing as discipline and in-depth description of the two breeds.

Apart from literature review this study includes research on measuring withers height, chest girth, cannon bone circumference for both breeds to draw comparisons. Beside measurements conformation of horses was compared based on full body photographs of the Akhal-Tekes and Thoroughbreds. Thoroughbreds, widely regarded as the standard for eventers, served as benchmark in this study. The results revealed that Akhal-Tekes had greater average withers height, which may be an advantage in stride length and jumping ability. In contrast, Thoroughbreds demonstrated larger cannon bone circumference and chest girth that indicate superior strength and load carrying capacity.

By highlighting the unique physical characteristics of each breed, the findings suggest that Akhal-Teke possess structural characteristics that could make them suitable for eventing. This study provides valuable insight for breeding and training practices aimed at optimizing Akhal-Tekes for equestrian sports and opens further research on their performance traits under eventing conditions.

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8.1. Figure sources

Figure 1: 1936 Olympic 3-day eventing, Captain Stubbendorf (GER) clears the difficult fascine ditch on Numi, Photo: IOC, Source: <https://eventingnation.com/history-of-eventing-the-insanity-begins/>

Figure 2: Elisa Wallace and Simply Priceless aka Jonny (Thoroughbred). Photo by Nico Morgan, Source: <https://eventingnation.com/six-eventers-you-were-inspired-by-in-2016/>

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Figure 4: Cartographic view of SI Stud Farm in Tata Agostyán. Source: Google Maps

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Figure 6: Horse measuring tape, Source: <https://www.amazon.com/Measuring-Weight-Portable-Animal-Husbandry/dp/B0B69CN45X>

Figure 7: Livestock measuring stick, Source: <https://ncequine.com.au/product/aluminium-horse-measuring-stick-extending-with-level/>

Figure 8: Soft measuring tape, Source: <https://www.pinterest.com/pin/soft-measuring-tape-ruler-60-inches-150cm--488007309626819031/>

Figure 9: Recording body measurements on horse (Schandl, 1955), Source: Live weight and body measurement of Hungarian Thoroughbred broodmares - Scientific Figure on

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Thesis progress report for veterinary students

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Thesis title: Akhal-Teke as potential eventing horse in future

Consultation – 1st semester

Timing				Topic / Remarks of the supervisor	Signature of the supervisor
	year	month	day		
1.	2023	06	16	Meeting with Dr. Kocs I	Dr. Gáspárdy András
2.	2023	11	08	Meeting with Dr. Kocs II / Contacts for literature sources	Dr. Gáspárdy András
3.	2023	12	02	Field trip I	Dr. Gáspárdy András
4.	2023	12	16	Field trip II	Dr. Gáspárdy András
5.	2024	04	07	Starting collection of literatures	Dr. Gáspárdy András

Grade achieved at the end of the first semester: ...5 (excellent).....

Consultation – 2nd semester

Timing				Topic / Remarks of the supervisor	Signature of the supervisor
	year	month	day		
6.	2024	08	10	Meeting with Dr. Kocs	Dr. Gáspárdy András



7.	2024	09	20	Discussion with Dr. Gáspárdy	Dr. Gáspárdy Dániel
8.	2024	10	17	Writing thesis	Dr. Gáspárdy Dániel
9.	2024	11	26	Finishing thesis	Dr. Gáspárdy Dániel

Grade achieved at the end of the second semester:5 (excellent).....

The thesis meets the requirements of the Study and Examination Rules of the University and the Guide to Thesis Writing.

I accept the thesis and found suitable to defence.

Dr. Gáspárdy Dániel
signature of the supervisor

Signature of the student:
[Signature]

Signature of the secretary of the department:

Date of handing the thesis in.....2024.11.29.....