

LINES INFLUENCE ON THE EXTERIOR CHARACTERISTICS OF HORSE SPORTING BREEDS STALLIONS IN THE CZECH REPUBLIC

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ABSTRACT

The unified and modern way of thinking the society is able to produce contributes to breeding of a modern sporting horses, which are specialized for a certain equestrian discipline. This, however, eliminates the differences between various breeds and their cultivation is inter-linked by breeding, which, based on a number various factors, also accepts stallions from different breeds. One of these factors is accepting new blood into the breed, which can be done on basis of knowing origins of single horses and their consecution of their own ancestors. From this point of view, line breeding can be considered a method of selecting the appropriate pair of parents.

In our work, we focused on judging various lines by four basic measurements.; The file was then subjected the general linear model and if a statistical signigance was found, a multiple comparison was applied.

Our sample consisted of 351 stallions, which were acquired into the studbook of Czech warm-blooded horse between 2009 and 2013. A selection was then performed to omit inadequate data, which lead to narrowing the sample down to 263 stallions. These stallions were then divided into 24 lines and evaluated using statistical methods.

Subjecting the sample to general linear model identified statistically significant differences in Tape Withers Height (TWH), Cane Withers Height (CWH), and Shin Circumference (SC). Further tests with multiple comparison method indicated a statistically significant difference of the Shaggy line, which, compared to other lines, showed lower values. This might be caused by a more subtle constitution of these individuals as their ancestors originated from Arab horses. Therefore, Shagya individuals can be considered a line of refiners.

Key words: line breeding, stallions, modern sporting horse breeds, studhorse

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INTRODUCTION

There are many associations specializing on breeding warm-blooded horses for sports in the world. Mainly in Europe, these organizations aim to apply their breeding programs to the highest level possible, even to the highest equestrian sport levels. The inter-linking of various horse breeds and various breeding associations does already exist for many years.

In the Czech republic, the most common sport breed of horses is the Czech warm-blooded horse. Its studbook is still open for new applications. From the animal husbandry point of view it cannot be spoken about a breed as such; since because of a wide spectrum stallions from other breeds accepted to the studbook, the Czech warm-blooded horse is more or less a utility hybrid. The breeding itself does not happen within the boundaries of one breed; often there are stallions from different abroad locations used, which will sooner or later lead to creating an "European type of sporting horse". As such, the Czech warm-blooded horse should not be referenced to as a breed, more as member of a certain studbook..

The fact that the breeding is occurring with a certain line leads to a subsequent unexpected combinations occurrences in family trees of recent sporting horses (e.g. mother Czech warm-blooded, father Hannover horse, grandfather Dutch warm-blooded horse etc.). The outcome of such combinations are individuals, which may vary significantly in basic morphology traits and the breed itself slowly becomes non-homogenous.

The acceptance of a certain stallion to the studbook has certain conditions - these consists mainly of exterior appearance traits and sporting performance achievements. The definition of line breeding claims the line can be founded by an individual, which is able to pass his distinctness, utilization, performance and exterior (morphology) traits on to his successors. Theoretically, every single line has the prerequisites to produce morphologically homogenous individuals.

The main goal of our work was identify if there are statistically significant differences in stallions from various lines.

MATERIAL AND METHODS

Basic database creation

The foundations of our database consisted of data obtained from the Association of Czech warm-blooded horse breeders. A total count of 351 stallions was selected for our sample, all of these stallions have entered the studbook between 2009 and 2013. In total, there 29 lines to be identified in the breeding process of the Czech warm-blooded horses. For our work, we only used 24 of those lines, since the lines containing less than 3 stallions were omitted. We have recorded the same values for every studhorse; which line the given belongs to, the breed the individual belongs to and body measurements TWH, CWH, CC, SC

Assortment of the selected file

All obtained data were sorted based on the line the individual belonged to and also based on the body measurements

TWH – tape withers height

CWH – cane wither height

CC – chest circumference

Line:

COR DE LA BRYERE	FAX 1	ORANGE PEEL XX - ALMÉ Z
1000 DER LÖWE XX	FLING XX	PERFECTIONIST XX
5500 PYTHAGORAS	FURIOSO	PHALARIS XX
83 ATHANASIUS (PIK AS)	FURIOSO XX	PRZEDSWIT
ABGANZ	GOTTHARD	RAMZES 4028
CATALIN	GRANDE	SACRAMENTO SONG XX
COTTAGE SON XX	HYPERION XX	SHAGYA
DETEKTIV	LADYKILLER XX	TEDDY XX
EINGAS	MASIS XX	WOHLER

Statistical data processing

All data were subjected to the general linear model (GLM) in UNISTAT 5.1 program. Based on its results, the differences between values were calculated by a succeeding Turkey – B test. The test was conducted with a level of significance $P \leq 0,05$.

Model equation:

$Y_i = \mu + p_i + e_{ij}$, where:

μ = general medium value

p_i = effect of line i ($i = 1, \dots, 24$)

e_{ij} = reziduum

RESULTS AND DISCUSSION

The following tables allow us to evaluate the population of studhorses of sporting horses based on the line and their physical parameters (tab. 1, 2 and 3). However, these studhorses cannot be found only in the studbook of the Czech warm-blooded horse, they also belong to other studbooks. Of course, there are certain conditions for a stallion to become a studhorse of the Czech warm-blooded horse breed. These conditions are the following; the CWH of an individual should be 162 - 170 centimeters and the shin circumference should be 21.0 - 22.5 centimeters. these values are, however, considered more a point of orientation than a restriction. A point to consider is that acquiring individuals with significantly diverse values into the studbooks might bring too much diversity into the breed itself.

When evaluating the CWH, it can easily be notified that the vast majority of the lines does not differ too much from the given standard. The only exception is the Shagya line (CWH = 158.2 cm), which belong to a line of Arab horses founded by Shagya XXI - Top, which can be found in origins of 4 lines, the fifth line has an ancestor from the Dahoman line. Being an army horse in the past, the Shagya line brings grandness, long life spans and stiffness to the breed. A CWH above the standard can be observed in the Eingas line, but this line only contains 3 studhorses. This group is being overwhelmed by a Hannover stallion 2771 Euripides, which has reached a CWH of 176 centimeters, which consequently influences the whole file. Other stallions in this file also belong to the Hannover horse studbook and their CWH belong to higher values.

The remaining lines reach average values; none of them overreaching the lowest value of Shagya horse. When it comes to the high values of CWH, there are more lines closing in on it. Mainly

thoroughbred horses, which have acquired German, Dutch, French and other warm blooded horses bred to achieve higher performance in sports.

Tab. 1 Line - based Evaluation of CWH

Line	Stallion count	Average	Median	Min	Max	Deviation
COR DE LA BRYERE	40.00	167.60	167.00	162.00	180.00	3.43
1000 DER LÖWE XX	7.00	167.00	167.00	164.00	169.00	1.66
5500 PYTHAGORAS	8.00	166.29	167.00	161.00	171.00	3.15
83 ATHANASIUS (PIK AS)	4.00	167.75	167.50	166.00	170.00	1.48
ABGANZ	7.00	165.57	165.00	162.00	174.00	3.74
CATALIN	3.00	167.33	168.00	163.00	171.00	3.30
COTTAGE SON XX	19.00	168.21	168.00	162.00	174.00	3.61
DETEKTIV	15.00	165.73	166.00	162.00	170.00	2.38
EINGAS	3.00	171.00	169.00	168.00	176.00	3.56
FAX 1	3.00	162.67	162.00	161.00	165.00	1.70
FLING XX	3.00	167.67	167.00	165.00	171.00	2.49
FURIOSO	4.00	167.00	167.50	164.00	169.00	2.12
FURIOSO XX	14.00	166.46	167.00	161.00	171.00	2.98
GOTTHARD	5.00	166.00	166.00	162.00	170.00	3.16
GRANDE	6.00	167.67	168.50	163.00	171.00	2.92
HYPERION XX	3.00	166.00	167.00	163.00	168.00	2.16
LADYKILLER XX	27.00	167.89	167.00	164.00	177.00	3.00
MASIS XX	6.00	165.00	166.00	161.00	168.00	2.61
ORANGE PEEL XX - ALMÉ Z	28.00	167.61	168.00	161.00	174.00	3.20
PERFECTIONIST XX	6.00	166.67	167.00	163.00	170.00	2.29
PHALARIS XX	14.00	164.50	163.50	161.00	169.00	2.69
PRZEDSWIT	9.00	165.11	165.00	162.00	168.00	1.91
RAMZES 4028	11.00	167.73	167.00	163.00	175.00	3.36
SACRAMENTO SONG XX	4.00	167.25	166.50	164.00	172.00	2.95
SHAGYA	5.00	158.20	158.00	155.00	162.00	2.93
TEDDY XX	6.00	166.33	166.50	161.00	170.00	2.92
WOHLER	3.00	169.00	168.00	161.00	178.00	6.98

The chest circumference is measured with a tape right behind the withers. This value is affected by the nutrition status of a given individual and also gives us a hint on the horse's condition, and chest spaciousness along with TWH and CWH. Table no. 2 shows almost equal values of chest circumference for almost all lines. the exception is - again - the Shagya line, which has lower values. Considering that the CWH of this line was also lower, this a logical occurrence. Please note also the 1000 Der Loewe xx line, which reaches the highest measured values, has the biggest maximum and also its minimum is amongst the higher values of all. This line will be further discussed when describing the shin circumference.

Tab. 2 Line - based chest circumference evaluation

Line	Stallion count	Average	Median	Min	Max	Deviation
COR DE LA BRYERE	40.00	193.68	193.00	185.00	205.00	5.16
1000 DER LÖWE XX	7.00	200.75	200.00	188.00	212.00	7.73
5500 PYTHAGORAS	8.00	193.63	193.50	186.00	198.00	3.90
83 ATHANASIUS (PIK AS)	4.00	193.50	194.50	188.00	197.00	3.50
ABGANZ	7.00	190.43	190.00	183.00	205.00	6.93
CATALIN	3.00	196.67	197.00	193.00	200.00	2.87
COTTAGE SON XX	19.00	192.68	192.00	188.00	206.00	4.32
DETEKTIV	15.00	194.33	193.00	185.00	205.00	5.86
EINGAS	3.00	193.00	195.00	188.00	196.00	3.56
FAX I	3.00	194.00	192.00	188.00	202.00	5.89
FLING XX	3.00	196.00	190.00	188.00	210.00	9.93
FURIOSO	4.00	196.25	196.00	195.00	198.00	1.09
FURIOSO XX	14.00	193.38	192.00	182.00	203.00	5.55
GOTTHARD	5.00	195.60	195.00	185.00	205.00	6.74
GRANDE	6.00	192.33	192.00	186.00	197.00	3.86
HYPERION XX	3.00	191.33	192.00	185.00	197.00	4.92
LADYKILLER XX	27.00	195.04	195.00	185.00	203.00	4.78
MASIS XX	6.00	190.40	190.00	185.00	195.00	4.08
ORANGE PEEL XX - ALMÉ Z	28.00	195.00	194.50	184.00	208.00	6.06
PERFECTIONIST XX	6.00	194.17	194.00	189.00	200.00	3.44
PHALARIS XX	14.00	191.50	192.50	180.00	200.00	4.79
PRZEDSWIT	9.00	192.11	194.00	186.00	196.00	3.21
4028 RAMZES	11.00	194.82	192.00	190.00	205.00	4.84
SACRAMENTO SONG XX	4.00	197.50	198.00	194.00	200.00	2.60
SHAGYA	5.00	185.60	184.00	175.00	196.00	8.21
TEDDY XX	6.00	192.33	195.00	180.00	200.00	6.77
WOHLER	3.00	198.33	200.00	190.00	205.00	6.24

Shin circumference (table no. 3) is an indicator of skeleton strength and boniness index. The minimal values for this measurement go once again to the Shagya line, which has reached an average value of 20 centimeters. However, there are not any lines with shin circumference higher than 20.7 centimeters in the whole file. This could have a negative impact on the exterior of the given individual; also, the fundament could get overloaded more easily. The highest values can be seen in the 1000 Der Loewe line, which has reached an average shin circumference of 22.38 centimeters. The Der Loewe line has its representatives also in the Czech republic, the concrete stud horses are Lugano I a Lugano II. These two stud horses have also spread this successful line in Germany and The Netherlands. The most significant representative of this line in the Czech republic is Lopez, which has been imported from the Hannover area and acquired to the studbook in 1990. This stallion has reached the show-jumping T-difficulty and his successors are able to performed at the highest levels possible. All stallions from the 1000 Der Loewe line belong to outstanding studhorses of the Hannover line, which produces a modern sport horse for all disciplines of equestrian sport.

Also worth mentioning is the Przedsvit, which mostly consists of stallions with Austrian blood. These horses are of a chivalrous and harmonic type. In the past, they were often used as army horses; thus they have high endurance and strong skeleton.

Tab. 3 Line-based shin circumference evaluation

Line	Stallion					
	count	Average	Median	Min	Max	Deviation
COR DE LA BRYERE	40.00	21.83	21.50	20.50	24.00	0.68
1000 DER LÖWE XX	7.00	22.38	22.50	21.00	23.50	0.73
5500 PYTHAGORAS	8.00	21.63	21.50	20.50	22.50	0.64
83 ATHANASIUS (PIK AS)	4.00	21.50	21.50	21.00	22.00	0.35
ABGANZ	7.00	21.94	22.00	21.00	23.00	0.61
CATALIN	3.00	21.33	22.00	19.50	22.50	1.31
COTTAGE SON XX	19.00	21.47	21.50	20.00	22.50	0.67
DETEKTIV	15.00	22.25	22.00	21.50	23.50	0.58
EINGAS	3.00	21.67	22.00	21.00	22.00	0.47
FAX I	3.00	21.63	21.50	21.00	22.40	0.58
FLING XX	3.00	21.90	21.90	21.50	22.30	0.33
FURIOSO	4.00	21.75	21.55	21.40	22.50	0.45
FURIOSO XX	14.00	21.43	21.50	20.00	22.00	0.67
GOTTHARD	5.00	22.00	22.00	21.00	23.00	0.63
GRANDE	6.00	21.95	22.00	21.50	22.70	0.40
HYPERION XX	3.00	21.80	21.90	21.00	22.50	0.62
LADYKILLER XX	27.00	21.73	21.80	20.70	23.00	0.56
MASIS XX	6.00	21.44	21.50	21.00	22.00	0.34
ORANGE PEEL XX - ALMÉ Z	28.00	21.73	21.75	20.00	23.50	0.77
PERFECTIONIST XX	6.00	21.68	21.75	21.20	22.10	0.36
PHALARIS XX	14.00	21.08	21.00	20.30	22.20	0.60
PRZEDSWIT	9.00	22.01	21.80	21.00	23.50	0.77
RAMZES 4028	11.00	21.78	21.80	21.00	22.50	0.38
SACRAMENTO SONG XX	4.00	21.70	21.65	21.50	22.00	0.21
SHAGYA	5.00	20.00	20.00	19.50	20.70	0.46
TEDDY XX	6.00	21.50	21.40	20.50	23.20	0.83
WOHLER	3.00	21.77	22.00	21.00	22.30	0.56

CONCLUSIONS

The knowledge of exterior traits of various lines will help us achieve the destined breeding goal. There is a thesis that assumes that a physical constitution of an individual has a big influence on the individual's performance and health.

In our work, we focused on evaluating various lines on basis of four essential body measurements. The sample was further tested using the general linear model, whenever a statistically significant difference was detected, the Turkey-B test of multiple comparison was carried out.

The results clearly indicate a statistically significant difference of the Shagya line for Tape Withers Height, Cane Withers Height and Shin Circumference. Due to the Shagya line emerging from an Arab horse, the studhorses acquired to the studbook of Czech warm-blooded horse were not as tall as other lines and also the overall skeleton strength was lower.

The studhorses of every line came from thoroughbred breeds and have been bred for a very long period of time. they have served to modify heavy German thoroughbred horses, which - in exchange - have given back the constitution stiffness and resistance. These lines have, however, not shown any statistically significant difference; even if the 100 Der Loewe line has shown higher values for some measurements.

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