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ANALYSIS OF LINES AND BREEDS OF SIRES IN THE BREEDING OF THE CZECH WARMBLOOD HORSES BASED ON GRADING THEIR OFFSPRING IN REARING FACILITIES FOR TESTING YOUNG HORSES (RFT)

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Abstract

ČERNOHORSKÁ HANA, SOBOTKOVÁ EVA, KOSŤUKOVÁ MARTINA, BIHUNCOVÁ IVETA, ORAVCOVÁ IVANA: *Analysis of lines and breeds of sires in the breeding of the Czech warmblood horses based on grading their offspring in rearing facilities for testing young horses (RFT).* Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, 2013, LXI, No. 6, pp. 1605–1612

The objective of the present study was to evaluate the effect of the breed of sire and line of sire on grading of the body conformation and performance of colts of warmblood horses in rearing facilities for testing young horses (RFT). The groundwork database contained data from 2001 to 2011 from nine RFT's. The database was processed statistically using the GLM method to assess the statistical significance of the effect of the breed of the sire and line of the sire on body conformation and performance of the colts. By multiple comparisons of the individual effects using the Tukey-B method we discovered statistically significant differences in the body conformation and performance of colts of sires among the respective breeds and lines.
The performance of the offspring of Dutch warmblood, Hanoverian horse and Holsteiner horse sires is better than of the offspring of sires of the Thoroughbred, Czech warmblood and Selle Francais. The conformation of the offspring by sires of the Holsteiner horse and Hanoverian horse breeds is superior to that of offspring by sires of the Selle Francais and Czech warmblood. The mechanics of movement of the offspring of the 2300 Shagya XVIII-Báb. line is inferior to the offspring of the following lines: 3100 Adeptus xx, 67 Dark Ronald, 1000 Der Lowe xx, 3250 Dwinger 3257, 4800 Ladykiller xx, Orange Peel xx – Alme Z, 1100 Przedswit VI-Rad., 4900 Rantzau xx – Cor De La Bryere, 4600 Rittersporn xx – Ramzes 4028, 60 St. Simon and 88 Teddy. The effect of the line of the sires on the body conformation of colts has not been proved.

Czech warmblood, testing of colts, performance of horses, body conformation of horses

European countries enjoying a long tradition in successful breeding of warmblood horses routinely apply various forms of grading young horses (Maršálek, 2000). The objective of such grading is, among others, to obtain data to be used to evaluate the standard of the population, for progeny testing and determining the breeding value of the parents (particularly of the sires more widely used in breeding) and last but not least to be used to select animals with a talent for sport (Bruns *et al*., 2001). The breeding value (BV) is a relative figure which relates to the population in which it was estimated. The assessment of the breeding value (BV) is based on performance tests (Jiskrová, 2009). The breeding value of the individual and the genetic standard of the population in dependence on time represent the genetic progress of the population (Přibyl, 2008).

Selection is based on results of evaluations of the animal and its progeny (Šarovská, 2010). On the bases of selection genetic progress is achieved the

result of which is development of the breed and increase in its average genetic standard (Jiskrová, Misař, 1997). Important for correct selection is, among others, to understand the heritability coefficient of properties such as body conformation, mechanics of movement, jumping quality, all of which determine the quality of the animal (Zuravcová, 2009). Dušek (2007) reported that mechanics of movement have a mean heritability (h^2 ranging between 0.5 and 0.6); the heritability of the body conformation is lower (h^2 around 0.30).

The most widespread breed of horses in the Czech Republic is the Czech warmblood comprising 28% of the total number of horses bred in the Czech Republic (Misař, 2011). The present trend of using the warmblood in equestrian sports increases the demands for the quality of the produced foals. Act No. 154/2000 Coll. on selection, breeding and data recording of farm animals (Animal Breeding Act) as amended, based on Act No. 130/2006 Coll. is the legal basis for horse breeding in the Czech Republic. Sires of the most important world lines of warmblood horses are used in the breeding of the Czech warmblood (Sixta, 2006). Purebred breeding and correction of breeds permitted by the Stud Book Code is used to implement the breeding objective (Misař, 2011). The mainstay of genetic progress in the performance of the Czech warmblood is genetic information and phenotype manifestations of performance of the progeny of foals by sires used in the breeding of the Czech warmblood (Zuravcová, 2009). Colts of the Czech warmblood are tested from weaning until the completion of the basic performance tests of sires in the RFT's (Yearbook of the Czech Warmblood Horse Breeders Association (Nováková, 2010). Koenen *et al.* (2004) reported that results of evaluations of young horses (graded in rearing facilities for testing young horses, results of criteria of young horses, basic performance tests of mares and stallions) are highly correlated (0.7 to 0.9) with later results of horses in competitions.

The objective of the present study was to assess the effect of the line and breed of the sire on evaluations of the body conformation and mechanics of movement of the progeny on the basis of results of grading the colts in rearing facilities for testing young horses. Further, to use statistical methods to evaluate whether the differences in the evaluation of the progeny by sires of the individual lines and breeds of warmblood horses are significant.

MATERIAL AND METHODS

The groundwork database was created on the basis of results of tests of the colts in the RFT in co-operation with the Central Records of Horses in Slatiňany. The database includes data from the following RFTs: Horní Město, Luka – Týn, Tlumačov, Měník, Písek, Suchá, Železnice. The colts were appraised by a three-member appraisal committee consisting of a representative of the rearing section of the board of the Czech Warmblood Horse Breeders Association, consultant in the respective field and one member of the Studbook Council.

Groundwork data included results of regular spring and autumn grading of colts in the RFTs in the period from 2001 to 2011. Elaborated and assessed were only the results of horses which had completed the entire testing. Incomplete data of colts (due to death of the colt during the testing or excluding the colt from testing by decision of the appraising committee) were eliminated.

The database of each colt consists of the name of the colt, date of birth, identification number, life number, name of sire, name of dam, name of sire of dam, owner of the colt, the rearing facility for testing young horses and body measurements (stick-measure, tape-measure, heart-girth, bone) and grades for the body conformation, mechanics of movement and growth standard. The body conformation and mechanics of movement were graded on a scale of 1 to 5, the growth standard on a scale of –2 to +2. Body measurements are given in centimetres. The measurements of the respective colts were carried out at the age of 6, 12, 18, 24, 30 and 36 months and in the text and graphs they are distinguished by indices of 1 to 6. The database was completed with the following data: line according to the sire, breed of sire and year of grading of the colts.

Basic statistical processing was performed, the standard deviation was determined and also the average characteristics of mechanics of movement according to the line and breed of the sires. The sires were divided according to the respective lines and breeds on the basis of available information from the Czech Warmblood Horse Breeders Association. Analysis of variance was performed using the GLM method and was followed by tests for the following factors: rearing facility for testing young horses, year of grading the colts in the RFT and the line and breed of the sire according to the model equation:

$$y_{ijkl} = \mu + p_i + s_j + y_k + e_{ijkl},$$

where:

μ ..... general mean value

p_i ..... effect of the i^{th} line of sire/breed of sire ($i = 1, \ldots 37$)

s_j ..... effect of the j^{th} rearing facility ($j = 1, \ldots 7$)

y_k ..... effect of the k^{th} year of test ($k = 1, \ldots 11$)

e_{ijkl} .... residue.

Where the results were statistically significant we conducted multiple comparisons of the individual effects using the Tukey – B method and the focus was on comparisons of the individual lines of the sires and breeds of the sires of the colts. The effect of the rearing facility for testing the colts and the year of the test were included in the model equation to eliminate their effect. The Excel and Unistat, version 5.1, programmes were used to process the database and for statistical evaluations.

RESULTS AND DISCUSSION

The groundwork database contained data collected between 2001 and 2011 from nine rearing facilities for testing young horses (RFT): RFT Albertovec, RFT Horní Město, RFT Chlumec, RFT Luka – Týn, RFT Měník, RFT Nový Dvůr, RFT Suchá, RFT Tlumačov and RFT Železnice. Only colts which had complete data were entered in the groundwork database. The groundwork database contained data from the respective grading of 720 colts by 145 various sires. The colts were divided into groups according to the breed and line of the sire. The groundwork database was used as a base to evaluate breeds and lines which had 5 or more colts in the groundwork database and whose data were complete.

During testing we evaluated the performance of the Czech warmblood colts giving one common mark for mechanics of movement and free jump. To assess the body conformation the horse is put to stand stationary in a natural posture on a firm horizontal surface. The Stud Book Code of the Czech warmblood allows the use of the Thoroughbred and a relatively wide range of breeds bred for sports performance to improve the properties and to boost performance (Misař, 2011). In 2001 to 2010 sires of 12 breeds were used in the breeding of the Czech warmblood; the belonged to 30 lines of warmblood horses. Sires of one line are frequently entered in various stud books. That is why we evaluated separately the effect of the breed of the sire and effect of the line of the sire on the mechanics of movement and jumping prowess (joint performance rating – PR) and body conformation rating (BCR) of the colts in the rearing facilities for testing young horses.

Tab. I shows the breeds of sires used in the breeding of Czech warmblood horses and their progeny in the rearing facilities for testing young horses. In the period of 2001–2010 the most frequently used sires were the following breeds: Czech warmblood (40 sires), Holsteiner horse (33 sires) and the Hanoverian horse (24 sires); they comprised 2/3 of the sires used in breeding. Other breeds were represented by 5 sires, on average. Most of the tested progeny were by sires of the Holsteiner horse (226 colts), Hanoverian horse (165 colts) and the Czech warmblood (127 colts). Sires of the Czech warmblood make up the largest part of sires used in breeding (27 %), to a lesser extent sires of the Holsteiner horse (23 %) and the Hanoverian horse (17 %); only less than 10 % are other breeds. Due to a great number of sires used in breeding and low intensity of selection, the Czech warmblood breed is as yet not very balanced in terms of the type, pedigree and performance (Misař, 2011).

The most numerous progeny in the rearing facilities for testing young horses was by sires of the following Dutch warmblood breed: Amarillo, Silvio II, Guidam Sohn and Oscar, each with more than 7 progeny tested. The Hanoverian horse used in the breeding of the Czech warmblood is most frequently represented by sires Faraday, Federweisser, Dantes, Grand Step, Le Patron and Radegast. Most of the progeny in the testing facilities is by the following sires of the Holsteiner horse: Ballast, Cassilius, Landino, Lantaan and Catango Z. Thoroughbred sires are used in the breeding of the Czech warmblood to a lesser extent; more progeny in the tests were only by the sire Regulus. The sires of the Selle Francais represented in the breeding of the Czech warmblood are First Bride, Manillon Rouge and Baxte de Quettehou. The number of progeny by sires of the Czech warmblood in the rearing facilities for testing young horses is low; more progeny is only by sires Lopez – 11, Przedswit XVI – 64 and Sahib Kubišta.

Tab. II gives the division of the sires in the breeding of the Czech warmblood according to their lines and their progeny evaluated in the rearing facilities for testing young horses. Most of the sires (17) belong to the 4900 Rantzau xx – Cor De La Bryere line; 13 sires belong to lines 67 Dark Ronald, 4800 Ladykiller xx and Orange Peel xx – Alme Z. Ten sires belong to the 1100 Przedswit VI-Rad. line; other lines are represented by less than 6 sires. Most

I: *Division of sires in the breeding of the Czech warmblood based on the breed and their progeny in rearing facilities for testing young horses*

Breed	Number of sires	Number of tested colts
Thoroughbred	5	17
Bavarian warmblood	8	33
Czech warmblood	40	127
Selle Francais	8	44
Furioso	5	10
Trakhener	5	12
Dutch warmblood	9	51
Slovakian warmblood	3	5
Hanoverian horse	24	165
Wielkopolski	2	5
Zangersheide	3	21
Holsteiner horse	33	226

II: *Division of sires in the breeding of Czech warmblood based on the line and their progeny in rearing facilities for testing young horses*

Line	Number of sires	Number of tested colts
3100 ADEPTUS xx	4	18
70 BARCALDINE	7	27
67 DARK RONALD	13	85
1000 DER LOWE xx	6	36
3220 DUELLANT 3586	6	16
3250 DWINGER 3257	1	21
3800 FANATIKER	1	5
FRA DIAVOLO xx	1	10
66 GAY CRUSADER	2	9
2020 GIDRAN IV-K	2	5
4300 GOLDSCHAUM xx	8	28
5020 IMPULS	3	8
4800 LADYKILLER xx	13	95
ORANGE PEEL xx – ALME Z	13	76
5200 PARSIVAL	2	5
92 PHALARIS – NEARCO	5	9
1100 PRZEDSWIT VI-Rad.	10	44
4900 RANTZAU xx – COR DE LA BRYERE	17	101
4600 RITTERSPORN xx – RAMZES 4028	5	36
SACRAMENTO SONG xx	1	8
2300 SHAGYA XVIII-Báb.	1	17
60 ST. SIMON	3	12
88 TEDDY	2	14
69 TOURBILLON	2	6

of the tested colts belong to lines 4900 Rantzau xx – Cor De La Bryere (101), 4800 Ladykiller xx (95), 67 Dark Ronald (85) and Orange Peel xx – Alme Z (76). The lines 70 Barcaldine, 1000 Der Lowe xx, 3250 Dwinger 3257, 4600 Rittersporn xx – Ramzes 4028, 1100 Przedswit VI-Rad. and 4300 Goldschaum xx are represented by 20 and more tested colts; other lines are represented by less than 15 tested colts. Since the number of sires is high, the number of colts born by the individual sires is low; as a result the numbers of the tested progeny are low (Misař, 2011).

The tested progeny of the line 60 St. Simon are mostly by sire Fors-Gedos and the progeny of line 70 Barcaldine are mostly colts by the sire Faraday. The more numerous progeny of line 3100 Adeptus xx in the testing facility is by sires Eibisch II and Everden; the 67 Dark Ronald progeny is by sires Ballast, Cassilius, Porter and Carbido; the progeny of line 1000 Der Lowe xx in the breeding of the Czech warmblood is by sires Lopez – 11 and Federweisser; progeny of the line 4800 Ladykiller xx is by sires Le Patron, Landino and Lantaan; the line Orange Peel xx – Alme Z is by progeny by sires Manillon Rouge, Veneur du Luc, Amarillo, Guidam Sohn and Aristo Z. The line 1100 Przedswit VI-Rad. is represented by progeny by sires Przedswit Primus and Przedswit XVI – 64; line 4900 Rantzau xx – Cor De La Bryere by progeny by sires Carol, Catango Z and Comero; line 4600 Rittersporn xx – Ramzes 4028 by progeny by sires Rock'n Roll and Radegast.

Tab. III gives results of an analysis using the GLM method exploring the effect of the line of the sire and breed of the sire on the mechanics of movement and jumping prowess (PR) in the rearing facilities for testing young horses. It was proved that the line of the sire has a statistically significant effect on the mechanics of movement and jumping prowess (PR) of colts aged 18 and 30 months and a highly statistically significant effect on evaluations of the mechanics of movement and jumping prowess (PR) of colts aged 12 and 24 months. It was further proved that the breed of the sire has a statistically significant effect on the mechanics of movement and jumping prowess (PR) of colts aged 6, 18 and 30 months and a highly statistically significant effect on the mechanics of movement and jumping prowess (PR) of colts aged 12 and 24 months.

Tab. IV gives results of an analysis using the GLM method exploring the effect of the line of the sire and breed of the sire on the body conformation (BCR) of the progeny in the rearing facilities for testing young horses. It was proved that the breed of the sire has a statistically significant effect on the

III: *Effect of line and breed of sire on the mechanics of movement of the progeny in rearing facilities for testing young horses*

Age of colts at grading (months)	Evaluation of mechanics of movement (PR)	Average	Line: statistical significance	Breed: statistical significance
6	PR_1	3.4		
12	PR_2	3.5	0.0369	0.0332
18	PR_3	3.5	0.0010	0.0006
24	PR_4	3.5	0.0047	0.0138
30	PR_5	3.5	0.0453	0.0309

IV: *Effect of line and breed of sire on evaluations of the body conformation of the progeny in rearing facilities for testing young horses*

Age of colts at grading (months)	Evaluation of body conformation (BCR)	Average	Line: statistical significance	Breed: statistical significance
6	BCR_1	3.4		0.0266
12	BCR_2	3.3		
18	BCR_3	3.3		0.0361
24	BCR_4	3.3		0.0112
30	BCR_5	3.3		0.0003

V: *Comparisons of evaluation of the performance of tested colts by sires belonging to various stud books – statistically significantly different pairs*

Breed	Average	A	B	C	D	E	F	G	H	I	J	K	L
A-Thoroughbred	2.97									*	*	*	*
B-Wielkopolski	3.00												
C-Furioso	3.00											*	
D-Slovakian warmblood	3.20												
E-Czech warmblood	3.25										*	*	*
F-Bavarian warmblood	3.36												
G-Selle Francais	3.37										*	*	*
H-Trakhener	3.46												
I-Holsteiner horse	3.54	*				*		*					
J-Dutch warmblood	3.57	*				*		*					
K-Hanoverian horse	3.57	*		*		*		*					
L-Zangersheide	3.58	*											

body conformation (BCR) of colts aged 18, 24 and 30 months. No statistically significant effect of the breed of the sire on the body conformation rating (BCR) of colts aged 6 and 12 months was proved. The line of the sire had no effect on the body conformation of the progeny in none of the age categories of the tested colts.

By multiple comparisons of the respective effects using the Tukey-B method we explored the statistically significant differences in the performance of progeny by sires from the individual lines and breeds. Tab. V illustrates the statistically significantly different pairs in evaluations of the performance of colts by sires belonging to the individual stud books. The statistical significance of evaluations of the progeny of Dutch warmblood, Hanoverien and Holsteiner sires is better than evaluations of the progeny of Thoroughbred, Czech warmblood and Selle Francais sires. The evaluation of the progeny of the Hanoverian sire is statistically significantly better that of the progeny of the Furioso breed.

The offspring by sires of the Czech breed was placed eighth in ratings of the mechanics of movement and jumping ability, averaging 3.25, and its performance is clearly worse than of offspring by sires of the Holsteiner horse, Dutch warmblood and Hanoverian horse breeds whose average rating of the mechanics of movement and jumping ability was 3.54, 3.57 and 3.57, respectively. Offspring by sires belonging to the Zangersheide stud book with mechanics of movement and jumping ability averaging 3.58 was the best. The mechanics of movement and jumping ability of the offspring by sires of the Thoroughbred was the worst with an average score of 2.97 and the performance was demonstrably lower than offspring by sires of the Holsteiner horse, Dutch warmblood and Hanoverian horse breeds averaging 3.54, 3.57 and

VI: *Comparisons of evaluation of the body conformation of tested colts by sires belonging to various stud books – statistically significantly different pairs*

Breed	Average	A	B	C	D	E	F	G	H	I	J	K	L
A-Furioso	2.80												
B-Wielkopolski	2.90												
C-Thoroughbred	2.91											*	
D-Selle Francais	2.98									*		*	*
E-Slovakian warmblood	3.10												
F-Czech warmblood	3.11									*		*	
G-Bavarian warmblood	3.25												
H-Trakhener	3.29												
I-Holsteiner horse	3.30				*		*						
J-Dutch warmblood	3.32												
K-Hanoverian horse	3.39			*	*		*						
L-Zangersheide	3.50				*								

3.57, respectively, for mechanics of movement and jumping ability.

The highest-performance offspring was by sires of the lines 3100 Adeptus xx (average score for performance 3.79), 67 Dark Donald (average score for performance 3.65) and 4900 Rantzau xx – Cor De La Bryere (average score for performance 3.62). The poorest performance was seen in offspring by sires of the line 2300 Shagya XVIII-Báb. (mechanics of movement and jumping ability averaging 2.68).

The statistical significance of evaluations of the progeny of the 2300 Shagya XVIII-Báb. line is worse than that of the progeny of lines: 3100 Adeptus xx, 70 Barcaldine, 67 Dark Ronald, 1000 Der Lowe xx, 3220 Duellant 3586, 4800 Ladykiller xx, Orange Peel xx – Alme Z, 1100 Przedswit VI-Rad., 4900 Rantzau xx – Cor De La Bryere, 4600 Rittersporn xx – Ramzes 4028 and 60 St. Simon. In breeding the Czech warmblood the 2300 Shagya XVIII-Báb. line is represented only by the sire Sahib Kubišta. This sire is the successor of the Shagya XV line and carries the blood of the Przedswit III, Furioso X and Furioso XIV sires. For a certain period of time it was lent to the French breed; in the Czech breed it was useful especially as the father of daughters (Sixta, 2006).

By multiple comparisons of the respective effects using the Tukey-B method we explored the statistically significant differences in the body conformation of the progeny by sires from the individual lines and breeds. Tab. VI illustrates the statistically significantly different pairs in evaluations of the body conformation of colts by sires belonging to the individual stud books. The body conformation of progeny by sires belonging to the Holsteiner and Hanoverian stud books was statistically significantly better than the progeny by sires belonging to the stud book of the Selle Francais and the Czech warmblood.

The offspring by sires of the czech breed was placed seventh in ratings of the conformation; averaging 3.11. Along with the offspring by sires belonging to the Selle Francais stud book whose conformation averaged 2.98, their conformation is demonstrably worse than of offspring by sires of the Holsteiner horse and Hanoverian horse breeds with an average rating of the conformation 3.30 and 3.39, respectively. The conformation of offspring by Zangersheide sires with an average rating of 3.50 was the best; the worst conformation was seen in the offspring by sires of the Thoroughbred breed averaging 2.91.

The highest score for conformation and performance was achieved by offspring by sires of the Dutch warmblood breed, but unlike the offspring by Holsteiner horse and Hanoverian horse sires was not univocally better than of sires of the Czech breed. The performance of offspring by Selle Francais sires is demonstrably higher than of offspring by sires of the czech breed; however the Selle Francais sires cannot be indicated as improvers of the conformation because their conformation is demonstrably worse than the conformation of the Holsteiner horse and Hanoverian horse breeds.

On the basis of statistical processing of the results of grading colts in rearing facilities for testing young horses the sires of Hanoverian horse and Holsteiner horse stud books can be indicated as improvers of the performance and conformation of the Czech warmblood at the same time belonging to the lines 3100 Adeptus xx, 67 Dark Ronald and 4900 Rantzau xx – Cor De La Bryere. This is corroborated by Jiskrová and Misař (1997) who maintain that the strengths of the Holsteiner horse and Hanoverian horse breeds are sturdiness, earliness, excellent movement and jumping abilities. By contrast Krčová (2008) stated that imported sires of Holsteiner horse and Selle Francais stud books have the greatest effect on jumping performance; however sires of the Hanoverian horse breed did not win recognition as improvers of the jumping performance.

Krčová (2008) stated that when evaluating jumping competitions the offspring by sires Cartago Z (Holsteiner horse, line 67 Dark Ronald) and

Conterder (Holsteiner horse, line 4900 Rantzau xx – Cor De La Bryere) and by Acord II (Holsteiner horse, line Orange Peel xx – Alme Z) achieved the highest average value of AAP (average auxiliary points). These results correspond with conclusions of the present study. The following sires with offspring in rearing facilities for young horses are improvers of the performance and conformation: Eibisch II, Euripides, Everden, Ballast, Cascavello, Cassilius, Porter Calanthano, Carismo, Cartouche, Caletto III, Catango Z, Comero.

According to Misař (2011) the pedigree structure of dams of the Czech warmblood is very diverse. The reason for this variability is the fact that 250 sires performed in breeding in the past decade. Most of the progeny came from daughters of the sires of the Czech warmblood. Their pedigrees frequently included the Quoniam, Dietward and Servátor lines. The other numerous group is the progeny of dams of various breeds.

Since the Trakehner and Hanoverian gene pool of dams is predominant it deems appropriate to consolidate the breeding base including, in particular, Hanoverian and Trakehner sires; these sires could suitably link up with related sources in the pedigree of the Czech warmblood and at the same time consolidate the variable base of the progeny of the Thoroughbred. In the selection of sires the priority is a high breeding value and related pedigrees. Sires of the Selle Francais could link up with the gene pool of the Czech warmblood which has sires Mykonos and Przedswit and their progeny in its pedigree. The Holstein gene pool could be a suitable base for the use of Holstein sires.

CONCLUSION

The groundwork database contained data collected between 2001 and 2011 from nine rearing facilities for testing young horses: Albertovec, Horní Město, Chlumec, Luka – Týn, Měník, Nový Dvůr, Suchá, Tlumačov and Železnice. At present the sires most frequently used in breeding the Czech warmblood are sires of the Czech warmblood, Hanoverian and Holsteiner horses. In spite of the diverse structure of the gene pool of dams of the Czech warmblood, the breed of the sire affected the body conformation and performance of the tested progeny. At one and the same time the line of the sire affects the performance of the progeny; however no effect of the line of the sire on the body conformation of the progeny was proved.

By multiple comparisons of the respective effects using the Tukey-B method we discovered statistically significant differences in the performance of the progeny by sires belonging to the respective lines and breeds. In the tests the performance of the progeny of the 2300 Shagya XVIII-Báb. line was statistically significantly worse than of the progeny of the lines 3100 Adeptus xx, 70 Barcaldine, 67 Dark Ronald, 1000 Der Lowe xx, 3220 Duellant 3586, 4800 Ladykiller xx, Orange Peel xx – Alme Z, 1100 Przedswit VI-Rad., 4900 Rantzau xx – Cor De La Bryere, 4600 Rittersporn xx – Ramzes 4028 and 60 St. Simon. Both the body conformation and performance of the progeny of the sires of the Czech warmblood and Selle Francais were worse than of the progeny of sires of the Holsteiner and Hanoverian breeds. This result confirms the present trend of using sires belonging to foreign stud books in the breeding of the Czech warmblood.

SUMMARY

On the basis of results of grading Czech warmblood colts in rearing facilities for testing young horses the objective of the present study was to evaluate the effect of the line and breed of the sire on the body conformation and performance of the progeny. The statistical method was used to evaluate any significant differences in the evaluation of progeny by sires belonging to the respective lines and breeds of warmblood horses.

The groundwork database contained data collected between 2001 and 2011 from nine rearing facilities for testing young horses. The colts were subjected to the individual measurements at 6, 12, 18, 24, 30, 36 months of age. In Czech warmblood breeding we used sires of 12 breeds belonging to 30 lines of warmblood horses. Sires of one line are very often entered in various stud books. That is the reason why we evaluated the effect of the breed of the sire and the effect of the line of the sire on the mechanics of movement and jumping prowess (joint performance rating – PR) and body conformation rating (BCR) of colts in the rearing facilities for testing young horses.

In spite of the diverse structure of the gene pool of dams of the Czech warmblood, the breed of the sire affected the body conformation and performance of the studied progeny. At one and the same time the line of the sire affected the performance of the progeny; however no effect of the line of the sire on the body conformation of the progeny was proved. Multiple comparisons of the individual effects using the Tukey-B test showed statistically significant differences in the performance of the progeny by sires belonging to individual lines and breeds.

Offspring by sires of the Zangersheide breed had the best body conformation and highest performance; the average score for the body conformation was 3.50 points and for mechanics of movement and jumping ability 3.58 points. The poorest conformation and performance was seen in offspring by sires of the Thoroughbred breed; the conformation and mechanics of movement and jumping ability averaging 2.91 and 2.97 points, respectively. It was clearly established that the performance of the 2300

Shagya XVIII-Báb. line was worse; the mechanics of movement and jumping ability averaged 2.67 compared to the lines: 1100 Przedswit VI-Rad. (3.27), 88 Teddy (3.47), 1000 Der Lowe xx (3.49), 4600 Rittersporn xx – Ramzes 4028 (3.49), 60 St. Simon (3.5), Orange Peel xx – Alme Z (3.52), 3250 Dwinger 3257 (3.54), 4800 Ladykiller xx (3.59), 4900 Rantzau xx – Cor De La Bryere (3.62), 67 Dark Ronald (3.65) and 3100 Adeptus xx (3.79). In the rearing facilities for testing young horses the effect of the line of the sires on the conformation of colts was not proved.

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