

# EVALUATION OF WORKING QUALITIES OF ORLOV TROTTER BREED HORSES OF DIFFERENT ORIGIN AND RESULTS OF THEIR TESTS IN THE CONDITIONS OF THE BRANCH “ODESSA HIPPODROME” SE ‘HORSE BREEDING OF UKRAINE’

S. Kosenko, V. Cheban, A. Cheban, A. Shulgina

Odessa, Ukraine  
Odessa State Agrarian University  
Department of Technology of Production and Processing of Livestock Products

**Annotation.** The current state of the breeding stock of Orlov trotters in Ukraine is studied and analyzed in the work. During the research of selection methods in farms of different forms of ownership it was found that the optimal method of breeding horses is cross lines, and crossing Orlov trotting breed with purebred riding breed does not significantly increase the liveliness and prize precocity of horses. In the Orlov trotter breed, the best indicators of liveliness belong to the offspring obtained as a result of complex inbreeding on such outstanding breeders as Pion, Fagot, Viter, Otklik, Pozyv. The crosses of the lines Barchuk × Pilot, Barchuk × Boltik, Ispolnitelny × Boltik turned out to be the most successful. The predominant number of descendants of class 2.05 was received from the stallions Prikaz (5 heads) and Otklik (4 heads). Promising lines in the reproductive composition of Orlov trotters of Ukraine are the lines of Barchuk, Pion and Pilot. Representatives of the Dibrivsky horse factory are characterized by the best indicators of an exterior.

Over the past 10 years, 7 records of the hippodrome have been set at the Odessa Hippodrome by horses of the Orlov trotter breed, 4 of which belong to the fosterlings of the Zaporizhia Horse Farm. The most progressive in terms of the number of victories in both traditional and ordinary prizes is Barchuk's line, the purposeful work of which has been carried out at the Zaporizhia Horse Plant for many years.

**Keywords:** horses, Orlov trotter breed, tests.

**Introduction.** Orlov trotter breed is a unique phenomenon not only for horse breeding in Russia or the CIS countries, but also in the world horse breeding [9]. The originality of selection and testing of horses of this breed, which has more than 200 years of history, has provided a set of valuable hereditary properties that you will not find in other trotters [1, 3]. It is this feature that allows the Orlov trotter breed to remain still popular. However, now the Orlov trotter is not experiencing the best of times. On the one hand, the breed is a symbol of domestic horse breeding, on the other - on the racetrack tests the percentage of Orlov breed is not more than 40, because the representatives of the breed by liveliness, and by precocity are much inferior to other trotter breeds - Russian trotter, American standard-breed and French [4, 7, 8].

The relevance of the topic is to develop a model for predicting possible combinations of domestic Orlov lines in order to improve the working qualities of horses during the tests at the racetrack.

The purpose of the work - by studying the genealogical structure of the Orlov trotter breed to analyze the effectiveness of the main methods of selection in farms and evaluate the main representatives of domestic lines for the quality of offspring.

**Materials and methods of research.** A database of horses of the Orlov trotting breed, data of primary breeding records, the results of expert evaluation of young animals and racetrack reports were the research materials.

The efficiency of purebred breeding of Orlov trotters along the lines is estimated, the efficiency of crossing of Orlov breed with purebred riding breed and formation of genealogical structure of breed is analyzed. The linear combination on the main selection traits was evaluated by comparing the analogues obtained in the corresponding selections.

According to the Instructions for grading horses [5] according to the results of broods 2017-2019 at the Odessa Hippodrome in the tested horses were determined:

- assessment of type and exterior on a 10-point grading scale;
- assessment of measurements (height at the withers, oblique length of the torso, chest girth, wrist girth);
- assessment of prize performance according to the results of tests at the racetrack during 2017-2019 in accordance with the "Rules of testing breeding horses of trotting, riding and heavy breeds at the racetracks of Ukraine" [6].

Materials of primary breeding records and databases were statistically processed in order to determine promising linear combinations in breeds while improving breeding traits. Biometric processing of quantitative features was carried out in the software environment MS Excel [2].

**Results and discussion.** According to the State Enterprise "Horse Breeding of Ukraine", as of January 1, 2019, the Orlov trotting breed of horses accounted for 25.2% of the total number of breeding horses. At the beginning of this year, this percentage was 23.5%, namely 424 heads.

Analyzing the genealogical structure of the Orlov trotter breed in Ukraine, we can observe a tendency to the disappearance of the lines of Uspekh, Ulov, Velbot, which 10 years ago were considered numerous. Currently, the most promising lines in the reproduction lineup are the lines of Barchuk, Pion and Pilot. The distribution of the mare composition by genealogical lines is according to the use of breeding stallions. The largest number of breeding mares belongs to the lines of Pilot (27.5%), Pion (23.9%) and Barchuk (19.9%). 8.0% of mares belong to the Ispolnitelny line, and 5.1% each to the Proliv and Boltik lines. Other lines include from 3.3 to 2.2% of mares.

When studying the performance of the offspring of breeding stallions of different lines, it was found that the best liveliness and precocity is inherent in the young of the Barchuk line (Table 1).

*Table 1. Liveliness of young of the Orlov trotter breed in the context of linear affiliation*

Line	Average liveliness and the number of offspring		Liveliness of offspring at the age:							
			2 years		3 years		4 years		older age	
			n	min. sec.	n	min. sec.	n	min. sec.	n	min. sec.
of Barchuk	2.09,2 ±0,13	3	30	2.27,5 ±0,36	15	2.17,4 ±0,47	-	-	-	-
of Ispolnitelny	2.08,0 ±0,29	2	34	2.33,1 ±0,24	28	2.24,7 ±0,39	13	2.16,0 ±0,62	5	2.12,2 ±0,29
of Viter	2.07,2	1	7	2.37,0 ±0,73	2	2.17,8 ±0,55	-	-	-	-
of Otboi	2.06,8	1	16	2.38,4 ±0,65	12	2.20,6 ±0,36	8	2.16,3 ±0,57	-	-
of Pion	2.06,6 ±0,18	4	63	2.39,3 ±0,78	37	2.23,7 ±0,28	15	2.20,7 ±0,43	4	2.11,1 ±0,24
of Boltik	2.17,0	1	12	3.03,5 ±0,33	1	2.26,0	-	-	-	-
of Pilot	2.06,1 ±0,24	3	85	2.39,4 ±0,49	52	2.28,5 ±0,43	18	2.17,8 ±0,19	8	2.17,5 ±0,32

According to Table 1, the liveliness of the offspring of the Pion, Ispolnitelny and Boltik lines in older age does not exceed the liveliness of the parents. This is due to the fact that the best working quality young animals are sold abroad, not having time to reveal their own potential at racetracks in Ukraine, which negatively affects the results of selection work in domestic farms.

At the age of two and three, the best indicators of liveliness belong to the young of the Barchuk line, at the age of four to the Ispolnitelny line, and to the older age to the Pion line.

When breeding horses of the Orlov trotting breed of the modern population, special attention is paid to the exterior and expressiveness of the body type. To improve and stabilize these features, it is necessary to take into account the linear combination in the selection of parent pairs.

For this purpose, the linear combinations in the Orlov trotter breed by type and exterior were evaluated. It was found that the best average score for type and exterior had horses belonging to the lines of Voin, Otboi, Barchuk and Pilot, as well as those in which the mother belonged to the line of Viter (average expert assessment of type and exterior - 3,64 points) and Ispolnitelny (3.63 points).

Analyzing the linear combinations in terms of liveliness, it was found that the higher efficiency had young animals obtained from crosses of the lines Barchuk × Pilot, Barchuk × Boltyk, Ispolnitelny × Boltyk. Representatives of these selection options had a liveliness from 2.08 to 2.08.8 min. sec. Horses obtained from crosses of the lines Pion × Barchuk, Barchuk × Viter, Viter × Ispolnitelny had the lowest liveliness - from 2.19.0 to 2.22.2 min. sec.

The Barchuk and Ispolnitelny lines were the best in intralinear combinations: the liveliness of two-year-old offspring was  $2.30.6 \pm 0.67$  and  $2.31.7 \pm 0.97$  min. sec. respectively, as well as Pilot and Barchuk for the liveliness of the descendants of three years of age -  $2.14.2 \pm 1.14$  and  $2.16.3 \pm 0.56$  min. sec. respectively. Barchuk's line was also the best in the number of descendants of class 2.10: 12.5%. Among the cross lines this indicator is the highest in the combination Ispolnitelny  $\times$  Viter (23.1%); in the combinations Viter  $\times$  Pion and Pion  $\times$  Proliv, this figure is 16.7%.

In the study of the influence on the results of selection of Orlov trotters crossbreeding with purebred riding breed, it was found that at the age of two stallions with the highest proportion of purebred in purebred riding breed (1/8 and 1/16) prevail purebreds in liveliness by 1.3 sec. At the same time, young animals with a proportion of purebred 1/32 is inferior to the liveliness of purebred by 2.0 s, and young animals with a proportion of purebred 1/64 - by 6.0 sec. ( $P > 0.90$ ) (Table 2):

*Table 2*

Comparative assessment of exterior and working qualities of breeding stallions of Orlov trotting breed depending on the level of proportion of purebred for purebred riding breed ( $n=56$ )  $\bar{X} \pm S_{\bar{x}}$

Feature	Genetic groups				
	purebred	the proportion of purebred by purebred riding breed			
		1/64	1/32	1/16	1/8
<i>l</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
n	26	4	8	9	9
Liveliness at the age, min.sec:	2.27,6	2.33,6	2.29,6	2.26,3	2.26,3
2 years	$\pm 0,18$	$\pm 0,66$	$\pm 0,34$	$\pm 0,06$	$\pm 0,27$
3 years	2.13,8	2.14,6	2.15,5	2.12,8	2.12,6
4 years	$\pm 0,05$	$\pm 0,16$	$\pm 0,15$	$\pm 0,09$	$\pm 0,14$
older age	2.08,5	2.10,9	2.10,9	2.09,9	2.08,6
	$\pm 0,05$	$\pm 0,16$	$\pm 0,21$	$\pm 0,08$	$\pm 0,09$
Number of victories in traditional prizes	2.06,3	2.06,7	2.06,8	2.07,5	2.04,8
	$\pm 0,06$	$\pm 0,01$	$\pm 0,09$	$\pm 0,13$	$\pm 0,07$
Number of prize places	5,26	1,50	3,83	5,13	7,00
	$\pm 0,85$	$\pm 0,50$	$\pm 1,56$	$\pm 1,94$	$\pm 2,24$
Height at withers, cm	11,27	7,00	11,86	14,00	16,78
	$\pm 1,36$	$\pm 1,96$	$\pm 2,70$	$\pm 1,66$	$\pm 2,97$
Oblique body length, cm	162,58	162,50	160,25	161,61	160,78
	$\pm 0,64$	$\pm 2,40$	$\pm 1,26$	$\pm 0,63$	$\pm 1,98$
Chest girth, cm	166,31	165,25	162,50	164,56	164,11
	$\pm 0,77$	$\pm 2,06$	$\pm 1,18$	$\pm 1,36$	$\pm 1,70$
Wrist girth, cm	184,92	184,00	179,38	182,67	184,44
	$\pm 1,04$	$\pm 3,39$	$\pm 1,16$	$\pm 1,43$	$\pm 2,01$
Expert type assessment of type and exterior, point.	21,14	20,75	20,50	20,83	20,64
	$\pm 0,20$	$\pm 0,32$	$\pm 0,25$	$\pm 0,19$	$\pm 0,30$
	7,76	7,31	7,73	7,58	7,61
	$\pm 0,06$	$\pm 0,45$	$\pm 0,25$	$\pm 0,22$	$\pm 0,06$

According to Table 2, stallions with a purebred proportion of purebred riding breed 1/8 and 1/16 at the age of three also have the best results of liveliness. Young animals with a purebred proportion of 1/32 are inferior to purebred horses by 1.7 sec. ( $P < 0.90$ ). But already at the age of four the best indicators of liveliness were found in purebred stallions - 2.08.5 min. sec. and in horses with a proportion of purebred 1/8 - 2.08.6 min. sec. The quietest were again stallions with a proportion of purebred - 1/32 and 1/64.

Among the older stallions, the liveliest were crossbred with the proportion of purebred for purebred riding breed 1/8 - 2.04.8 min. sec., which is 1.5 sec. higher than the liveliness of purebred stallions ( $P > 0.95$ ). The lowest rate of liveliness was in stallions with a proportion of purebred 1/16, which was 1.2 sec. inferior to purebred and 2.7 sec. to animals with proportion of purebred 1/8 ( $P > 0.90$ ).

In terms of the number of victories and prizes in the traditional prizes, stallions with a proportion of purebred 1/8 prevailed, and stallions with a proportion of purebred 1/64 had the worst results. Purebred stallions were inferior to crossbred with a proportion of purebred 1/8 in the number of first places by 1.74 ( $P < 0.90$ ), prize - by 5.51 ( $P < 0.95$ ).

By all measurements, type and exterior, purebred stallions predominated: at the height at the withers - by 2.33-0.08 cm, oblique body length - 3.81-1.06 cm, chest girth - by 5.54-0.48 cm, wrist girth - by 0.64-0.31 cm, according to expert assessment of type and exterior - by 0.45-0.03 points.

Similar studies have not been performed on breeding mares, as a significant proportion of them have not been tested on the racetrack, so there are no performance indicators that can be assessed.

Thus, it was found that crossing horses of the Orlov trotting breed with purebred riding breed does not significantly increase the liveliness and precocity, while deteriorating the exterior performance - measurements and typicality. At the same time, in the absence of new nurseries and mares, it is possible to infuse blood of purebred riding breed to obtain promising crossbreeds with proportion of purebred 1/8 and 1/16.

As a result of studying the working qualities (liveliness) of trotters of the Orlov breed for the last years it is established that the average liveliness on age groups changes on years. In older horses, this figure improves almost steadily, while the liveliness of young 2-3-year-olds varies depending on the year of testing (Table 3).

*Table 3*

The average liveliness of Orlov trotters, which were tested at the Odessa Hippodrome during 2017-2019, head

Years of testing	Average liveliness of horses aged:						Trotters of class 2.05 and livelier
	2 years		3 years		4 years and older		
	n	XB., c	n	XB., c	n	XB., c	
2017	66	2.30,5 ±0,49	48	2.16,8 ±0,19	21	2.11,0 ±0,23	-
2018	74	2.31,3 ±0,36	39	2.18,0 ±0,64	24	2.12,0 ±0,63	-
2019	71	2.32,4 ±0,48	52	2.18,6 ±0,27	25	2.13,3 ±0,44	-

Note:  $P > 0,95$

According to Table 3, for the last 3 years at the Odessa Hippodrome no Orlov trotters of class 2.05 were found. In total, for the period of 2009-2019, 183 heads of class 2.10 and 24 heads of class 2.05 and more agile were detected in Ukraine. The largest number of horses of class 2.05 and more agile was received from breeding stallions Prikaz (Karapet-Patoka) - 5 heads and Otklik (Otboy-Conventsia) - 4 heads, as well as from mare Kamenka (Korshun-Kvitochka) - 2 heads.

Table 4 shows the indicators of evaluation of representatives of different lines by the number of victories in the period from 2017 to 2019.

The tests effectiveness of the Orlov trotting breed horses of different lines

Line	Number of tested, head	Effectiveness of performances in different age groups							
		2 years		3 years		4 years		older age	
		traditional prizes	ordinary prizes	traditional prizes	ordinary prizes	traditional prizes	ordinary prizes	traditional prizes	ordinary prizes
of Barchuk	112	5	47	9	62	12	75	5	55
of Ispolnitelny	9	2	29	3	34	6	49	3	19
of Viter	45	2	31	6	53	9	61	5	22
of Otboy	39	3	35	5	40	7	53	3	34
of Pion	122	4	51	8	56	10	69	5	41
of Boltik	4	-	17	1	19	1	15	-	-
of Pilot	41	3	38	4	57	6	47	3	33

According to Table 4, the most progressive in terms of the number of victories in both traditional and ordinary prizes is Barchuk's line, purposeful work with which has been conducted for many years in the Zaporozhia horse factory.

### Conclusions.

1. The best performance is provided by young animals obtained from crosses of the lines Barchuk × Pilot, Barchuk × Boltik, Ispolnitelny × Boltik.
2. Crossing of horses of the Orlov trotting breed with purebred riding breed does not contribute to a significant increase in liveliness and prize precocity, while deteriorating the exterior performance - measurements and typicality.
3. At the age of two and three, the best indicators of liveliness belong to the young of the Barchuk line, at the age of four - to the Ispolnitelny line, to the older age - to the Pion line. According to the results of horse tests at the Odessa Hippodrome, Barchuk's line is the most progressive in terms of the number of victories in both traditional and ordinary prizes.

### Literature

1. Aleshchenko O.O, Rossokha V.I. Formation of the genetic structure of Orlov and Russian trotters in Ukraine. Scientific and technical bulletin of IAH NAAS. Kharkiv, 2012. № 106. P.137-142.
2. Baranovsky D.I, Braginets O.M, Khokhlov A.M. Biometrics in the software environment MS Excel: a textbook. Kharkiv: BAE PP Brovin O.V, 2017. 90 p

3. Bondar A.A. Horse breeding in Ukraine: milestones in history and modernity. Scientific and technical bulletin of IAH UAAS. № 82. Kharkiv, 2002. p. 131-138.
4. Gopka B.M, Burenko A.V, Shapoval V.M. Liveliness and precocity of Orlov trotters. Scientific Bulletin of NAU. 2007. Vip. 114. P.45-52.
5. Instructions for grading breeding horses. Instructions for keeping breeding records in horse breeding. Regulations on centralized breeding records in horse breeding. K. : Aristei, 2007. 108 p.
6. Rules of tests of breeding horses of trotting, riding and heavy breeds on hippodromes of Ukraine. URL: <https://zakon.rada.gov.ua/go/z0614-02> (access date 02.06.2020).
7. Selection-genetic monitoring in horse breeding: monograph / I.V.. Tkachova and others; ed. I.V. Tkacheva. Kyiv: Agrarian Science, 2018. 238 p.
8. Sobol O.M. Assessment of agility in horses of different lines of the Orlov trotter breed. Scientific and technical bull. RIAHF and P. Kharkiv, 1989. № 53. P.79-85.
9. Tkachova I.V. Modern linear structure of the Orlov trotter breed in Ukraine. Scientific and technical bulletin of the Institute of Animal Husbandry UAAS. 2009. №101.P.127-138.