

CHOLESTEROL LEVEL IN SERUM OF THOROUGHBRED FOALS BRED IN TWO DIFFERENT STUDS¹

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Abstract: The aim of his study was to evaluate the total cholesterol level (ChC), triacyloglycerols (TG) and HDL in blood of Thoroughbred foals during their development and the trial of evaluation of differences in concentration of studied components in two different studs. Average values of ChC, TG and HDL concentration during all studied period were on level considered as normal. Foals' sex had not any effect on the concentration of studied biochemical components in blood.

Key words: cholesterol, HDL, triacyloglycerols, Thoroughbred horses

Introduction

High rate of growth in Thoroughbred foals gives the possibility to obtain proper materials for research on changes during growth and development of these animals. It makes possible to observe the level of different biochemical indicators of blood as for example total cholesterol, triacyloglycerols and HDL-fraction of cholesterol. Blood indicators are characterised by some changes during growth and development periods as well as in adult life what can be the cause of some pathologies. This kind of changes are characterised for the level of mentioned before components. These changes could be caused by genetic, individual as well as environmental factors in which animals are born and reared (*Szczeklik 1974*). The aim of this study was to evaluate the total cholesterol (ChC), triacyloglycerols (TG) and HDL-fraction of cholesterol in blood of Thoroughbred foals during their growth period and the trial of indication of difference between foals from two studs in such a blood components.

Materials and methods

Material for this study was collected in two different studs – Moszna and Krasne. Blood samples were collected from 20 foals from each stud (40 foals together). Blood samples were taken monthly beginning with first month of life till the end of 16 month after birth (except August of first year). Totally 640 samples were analysed. Foals were kept together with their mothers to 6 month of life and then they were weaned. During the research the main fodder base were oats and hay, in summer additionally pasture and in winter red carrots. In collected material the level of cholesterol, HDL and triacyloglycerols was evaluated using ready-made enzymatic diagnostic kits. For obtained results the arithmetical means (\bar{x}) and standard deviation (SD) were counted. In statistic processing Duncan's test was used.

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*Results and Discussion**Table 1. Level ChC (mg/dl), TG (mg/dl) and HDL fraction (mg/dl) in serum of foals from Moszna stud divided into fillies and colts.*

Month of samples collection		ChC		TG		HDL	
		Fillies	Colts	Fillies	Colts	Fillies	Colts
May	\bar{x}	138,25	141,71	55,84	61,24	15,66	15,37
	SD	20,16	25,86	14,59	20,48	2,60	1,67
June	\bar{x}	135,70	130,39	103,61 A	52,58 A	15,62	15,68
	SD	16,78	18,97	86,50	19,07	1,52	2,18
July	\bar{x}	134,14	144,23	54,72	62,92	22,05	21,85
	SD	16,08	27,78	8,23	19,55	7,75	4,55
September	\bar{x}	111,19	117,10	21,99	15,49	12,03	12,14
	SD	10,39	10,14	8,17	7,14	1,37	0,90
October	\bar{x}	110,55	110,29	17,24	23,79	14,63	16,08
	SD	11,95	18,72	6,79	11,72	5,75	5,38
November	\bar{x}	109,18	109,43	21,12	19,33	15,18	13,37
	SD	9,58	10,80	5,38	10,05	3,51	1,47
December	\bar{x}	116,12	123,22	44,11	39,99	10,99	12,54
	SD	13,57	12,40	10,94	10,57	1,60	0,63
January	\bar{x}	110,34	100,62	43,49	36,29	11,02	12,68
	SD	14,83	9,20	8,07	6,93	1,49	3,44
February	\bar{x}	102,93	106,53	30,25	39,29	11,45	11,47
	SD	5,95	15,87	6,85	9,47	1,83	0,98
March	\bar{x}	104,6	105,18	42,62	45,93	14,27	12,47
	SD	10,30	10,71	10,88	11,48	8,46	1,99
April	\bar{x}	108,79	113,82	45,54	33,48	12,18	11,66
	SD	11,44	7,05	15,42	3,05	1,82	1,47
May	\bar{x}	108,70	106,58	60,69	47,71	12,38	13,44
	SD	9,50	5,99	18,69	13,53	1,71	2,27
June	\bar{x}	115,05	103,83	43,18	51,54	12,45	11,87
	SD	14,38	7,06	25,04	19,75	1,48	1,05
July	\bar{x}	110,26	108,35	39,56	33,13	13,01	12,83
	SD	9,20	8,27	22,88	25,11	1,66	5,11
August	\bar{x}	103,79	101,01	21,44	8,71	10,02	10,62
	SD	5,92	6,88	19,36	7,66	1,93	2,97
September	\bar{x}	102,12	105,24	21,67	29,86	10,58	9,96
	SD	5,25	5,89	6,89	6,97	1,13	1,14

\bar{x} - means; SD - standard deviation

Means marked by the same capital letters differ highly significantly $P \leq 0,01$

Table 1 shows the data concerning the level of total cholesterol (ChC), triglycerols and HDL fraction of cholesterol in two sex groups in particular months for foals from Moszna stud. In the research period any significant differences in ChC between fillies and colts were not noted. The level of TG evidently varied but only in June values for fillies and colts were significantly different. Any significant differences were not noted between sex groups in HDL-fraction of cholesterol.

Table 2. Level ChC (mg/dl), TG (mg/dl) and HDL fraction (mg/dl) in serum of foals from Krasne stud divided into fillies and colts

Month of samples collection		ChC		TG		HDL	
		Fillies	Colts	Fillies	Colts	Fillies	Colts
May	\bar{x}	179,04	161,74	92,53	97,67	118,57 A	82,41 A
	SD	31,10	64,01	27,88	36,24	33,99	54,11
June	\bar{x}	132,08	125,35	59,07	53,71	7,92	9,82
	SD	16,59	11,87	14,23	16,19	2,06	3,96
July	\bar{x}	113,32	115,59	57,10	63,16	28,69 B	46,39 B
	SD	15,32	18,02	16,83	27,72	6,52	24,44
September	\bar{x}	130,89	133,13	59,25	58,45	30,91	38,96
	SD	26,23	17,05	22,44	12,56	15,62	17,33
October	\bar{x}	158,14	160,02	65,16	70,39	71,46	81,60
	SD	39,79	39,32	12,70	16,64	24,17	50,31
November	\bar{x}	121,14	135,30	38,29	40,73	11,90	12,95
	SD	16,04	22,76	8,45	6,72	4,89	4,83
December	\bar{x}	124,58	126,32	48,36	45,35	14,96	11,88
	SD	19,05	39,91	23,28	12,33	5,67	2,60
January	\bar{x}	159,19	144,20	51,94	53,81	10,82	25,86
	SD	36,07	30,71	14,78	10,73	16,77	4,79
February	\bar{x}	108,4	106,82	41,93	49,27	11,06	13,86
	SD	9,72	8,63	6,82	17,81	2,52	3,78
March	\bar{x}	104,25	111,25	44,61	49,10	17,40	13,65
	SD	7,55	14,03	6,56	16,60	3,89	4,95
April	\bar{x}	101,85	102,86	34,75	40,25	15,06	16,26
	SD	6,40	3,49	11,06	8,80	3,97	4,04
May	\bar{x}	108,69	113,62	42,70	58,56	13,54	6,88
	SD	9,94	12,20	10,18	19,70	4,89	5,32
June	\bar{x}	111,23	110,66	27,51	29,49	11,07	12,41
	SD	8,87	10,88	6,84	8,54	1,88	4,29
July	\bar{x}	114,96	105,44	58,41	46,96	8,55	8,93
	SD	16,35	4,46	13,75	13,05	4,11	3,70
August	\bar{x}	100,11	113,23	38,79	35,95	,37	9,64
	SD	4,55	14,73	9,68	9,97	1,36	2,25
September	\bar{x}	106,34	108,44	40,26	41,37	10,29	8,61
	SD	8,74	9,45	15,61	9,77	2,99	1,97

\bar{x} - means; SD – standard deviation

Means marked by the same capital letters differ highly significantly $P \leq 0,01$

Table 2 shows the data concerning the level of the same blood indicators in two sex groups in particular months for foals from Krasne stud.

In the research period any significant differences in ChC and TG levels between fillies and colts were not noted. The level of HDL varied but only in May and July values for fillies and colts were significantly different. In next weeks after birth it is possible to observe many changes in foals' blood composition. Initially higher level of ChC, TG and HDL is caused by higher request by maturing liver. The process of connection TG into lipoproteins are increasing so there is much more of this component in blood of

young foals (Bauer 1990). Zontek (2000) noted the low level of TG together with high concentration of fatty acids in first day of foals' life and definitely opposite situation in few next days. It suggest the after parturition hypothermia which causes the lipolysis of TG and increases the production of fatty acids. After few days and after the normalisation of adaptation processes the level of TG increases. Very important factor affecting the blood composition is stress. According to Byszewski *et al* (1988) during the foals' rearing there are three critical periods: between third and fourth month of life, after weaning (in October) and during first change after weaning (from November to April). In this research it was shown that second stressogenic period was more significant in foals from Krasne stud, where all foals were weaned in sixth month of life and foals were deprived of mother's milk. It caused sudden increase of studied components. Also in Moszna stud in the same time foals were weaned but the changes in studied parameters during that time were not as evident as in Krasne stud. It could suggest that the weaning stress was not so high. The higher oscillation of average values of studied components in fillies and colts in Krasne stud could testify their higher excitability and deeper reactions on stress but horses in Moszna stud were characterised by more stabile results of biochemical components of blood what can be explained by their lower nervousity. It could be reflected in life and management conditions but it is difficult to state its effect on further racing performance of studied horses. Definitely it could be useful in foals rearing.

Conclusion

Average values of total cholesterol (ChC), HDL-fraction and triacylglycerols (TG) during all studied period (16 months) varied in borders recognised as normal. Sex of foals had not any significant effect on concentration of analysed biochemical components of blood. Highly significant differences were noted only for TG in third month of life of foals from Moszna stud and for HDL in first and third months of life of foals' from Krasne stud. The significant dependence between ChC, TG and HDL level and environment (studs) of foals' growth was observed.

NIVO HOLSTEROLA U SERUMU PUNOKRVNIH ŹDREBADI ODGAJANE NA DVE RAZLIČITE ERGELE

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Rezime

Brz porast kod punokrvne Źdrbadi daje mogućnost za dobijanje dobrog materijala za istraživanje promena tokom porast i razvoja ovih životinja. Moguće je posmatrati nivo različitih biohemijskih indikatora krvi kao što su ukupni holesterol, triacigliceroli i HDL-frakcije holesterola. Cilj ovog rad je bio ocena ukupnog holesterola (ChC), triacigliceroli (TG) i HDL frakcije holesterola u krvi punokrvne Źdrbadi tokom perioda porasta i pokušaj indikacije razlike između Źdrbadi iz dve ergele preko navedenih indikatora krvi. Materijal za ovo ispitivanje je sakupljan na dve ergele– Moszna i Krasne. Uzorci krvi su uzeti od 20 Źdrbadi iz svake ergele (ukupno 40). Uzorci krvi su uzimani mesečno od prvog meseca života do kraja 16 meseca. Ukupno 640 uzoraka je analizirano. U sakupljenom materijalu određivan je nivo holesterola, HDL i triacigliceroli korišćenjem gotovog enzimskog dijagnostičkog pribora. Prosečne vrednosti za ukupni holesterol (ChC), HDL frakcije i triaciglicerole (TG) tokom ispitivanog perioda (16 meseci) varirao je u okviru granica koje se smatraju normalnim. Pol Źdrbadi nije imao signifikantnog uticaja na koncentraciju analiziranih biohemijskih komponenti u krvi. Visoko signifikantne razlike su registrovane samo kod TG u trećem mesecu starosti Źdrbadi iz ergele Moszna i za HDL u prvom i trećem mesecu života Źdrbadi iz ergele Krasne. Signifikantna zavisnost između nivoa ChC, TG i HDL i uslova sredine (ergela) u porastu Źdrbadi je registrovana.

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