

RESEARCH ON THE AVERAGE DAILY PRODUCTION OF SPERMATOZOON FROM BOARS

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Abstract

The biological material was represented by 15 boars of Large White, Duroc and Landrace breed. Age of the boars was between 8 months and 31 months. Collecting frequency was reduced: one collecting followed by five days pause. At each collecting it was determined the volume of the ejaculation, the mobility of the spermatozooids and the concentration. Those indices were at the basis of determination of the total number of spermatozooids/ejaculation and the medium daily production of spermatozooids. This last parameter had values 15.7 ± 0.4 billion, with oscillation between 13.6 ± 0.3 billion for Great White boars and 19.1 ± 0.2 billion for Landrace boars. The differences between the two breeds were significant ($p < 0.01$). Depending on the age of boars, the differences were insignificant: 13.1 ± 0.3 billion, at the boars with the aged between 8-18 months and 18.3 ± 0.5 billion at the boars with the aged between 18 and 31 months ($p > 0.05$). Depending on the sampling season, there was difference between summer (12.5 ± 0.2 billion) and autumn (17.4 ± 0.5 billion) ($p < 0.01$). The research undertaken showed that the average daily production of sperm from boars was influenced both by internal environmental factors (race, age, and individual) and external environmental factors (season).

Key words: boars, average daily sperm production, factors of influence

INTRODUCTION

Preparation the spermogram of boars is a prerequisite to the efficient organization of breeding activity [1]. Knowing the level of sperm indices help determine the number of breeders in a unit and enables the exploitation of their on scientific principles [5, 6]. The spermatoc value index is in continuous dynamics in relation to the some external environmental factors (nutrition, microclimate, harvesting frequency, system maintenance etc.) and genetic factors: race, age, line, individuality [2, 3, 4, 7].

MATERIAL AND METHODS

The biological material was represented by 15 boars of Large White breeds, Duroc and Landrace. Observations were made from the age of 8 months and up to 31 months old. Boars were kept in individual pens with an area of 6 m^2 . Each harvest was followed by five days rest. Semen collection was done by

manual method. The main sperm indices were analyzed: volume of ejaculate, the semen concentration in spermatozoon's, the mobility and the total number of spermatozoon/ejaculate.

Ejaculate volume was estimated directly in the collector cup; concentration was determined using the fotodensimeter (Spermacue) and regularly with the haemocytometer; mobility was determined with the optical microscope with phase contrast and represent the proportion of spermatozoa with adequate motion. Semen dilution was made with a synthetic diluter and has provided 2.5 billion mobile spermatozoon's per dose.

RESULTS AND DISCUSSIONS

The average volume of ejaculate (from 8 to 31 months) was 199.1 ± 6.2 ml at Great White boars and significantly higher at Landrace boars: 258.8 ± 5.2 ml. At the Duroc boars were registered intermediate values: 235.8 ± 5.1 (tab. 1).

These values are similar to those cited in the specialty literature, for most breeds of swine [1, 2, and 7]. In all races there was an

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upward curve of the entry into service until age 30 months, which proves that the functioning of glands is highest during in this period. The average ejaculate volume calculated until the age of 18 months was

202.8 ml and slightly higher at the boars of 9-31 months category (258.9 ml) (tab. 1). The biggest difference between young and adult boars was found in Landrace breed (61.4 ml), and the smallest, at the breed Duroc (56.1 ml).

Table 1 The ejaculate volume in function by the age and breed of boars (ml)

Statistical parameters	Age (months)		Average	Race
	8-18	19 - 31		
\bar{X}	227.4	288.8	258,8±5,2	Landrace
$\pm s_{\bar{x}}$	3.6	4.8		
V%	26.3	27.4		
\bar{X}	172.3	225.1	199.1±6.2	Great White
$\pm s_{\bar{x}}$	5.2	9.7		
V%	28.6	31.2		
\bar{X}	208.7	262.9	235.8±5.1	Duroc
$\pm s_{\bar{x}}$	9.5	3.6		
V%	19.7	28.4		
\bar{X}	202.8	258.9	231.2±6.4	

The ejaculate volume was significantly influenced by individuality at the boars of the

all breeds (tab. 2). The limits have fluctuated between 158.3± 4.7 ml and 316.9 ± 6.7 ml.

Table 2 The individual variation of ejaculate volume (ml)

The boars	Registration number	\bar{X}	$\pm s_{\bar{x}}$	V%
L	3860	316.9	6.7	21.0
L	3861	256.0	4.9	18.6
L	4809	224.8	5.1	22.5
L	8809	283.5	9.5	19.6
L	8021	213.2	4.7	20.3
Average L		258.8	5.2	22.4
GW	5519	216.7	8.7	17.3
GW	5889	191.4	4.6	12.6
GW	6020	160.1	7.4	16.5
GW	5904	225.3	6.1	21.6
GW	5818	202.1	8.1	22.3
Average GW		199.1	6.2	28.2
D	8511	228.2	9.5	19.3
D	5406	298.8	3.8	15.8
D	5350	234.9	6.7	26.6
D	5420	158.3	4.7	17.3
D	5410	259.0	5.6	19.5
Average D		235.8	5.1	25.2
AVERAGE		231.2	6.4	19.3

L – Landrace; GW – Great White; D – Duroc;

Seasonal analysis of sperm count showed slightly lower values in summer (202.4±8.4 ml), compared with other times of the year in

which this indicator has fluctuated between 236.1±5.8 ml in the autumn and 241.0±9.6 ml in the spring (Table 3).

Table 3 The seasonal dynamic of ejaculate volume (ml)

Statistical parameters	Season				Average
	Winter	Spring	Summer	Autumn	
\bar{X}	245.4	241.0	202.4	236.1	231.2
$\pm s_{\bar{x}}$	11.1	9.6	8.4	5.8	11.2
V%	19.5	31.2	25.7	22.5	22.6

The average semen concentration in spermatozoa was 338.2 ± 8.3 millions spermatozoa per ml, with significantly differences between Duroc breed (300.2 ± 7.2 million gametes/ml) and other races (Table 4). For this indicator values are higher than those commonly cited by the specific references ($150 - 250 \times 10^6$ spermatozoa/ml) [1, 3, and 5]. Values comparable to those found by us were communicated for Pietrain boars [4].

Regarding the evolution of concentration in relation to age of boars are found the levels close during the evaluation, lower in early breeding activity and higher at age 30 months. Recorded values show that from the age of 1 year, spermatogenesis takes place at the optimum intensity. The normal activity of somniferous epithelium is maintained even after 30 months of age.

Table 4 The semen concentration in spermatozoon in function by the age and race (mill./ml)

Statistical parameters	Age (months)		Average	Race
	8-18	19 - 31		
\bar{X}	356.4	386.2	370.3 ± 7.6	Landrace
$\pm s_{\bar{x}}$	7.8	7.1		
V%	21.0	23.5		
\bar{X}	338.6	350.8	344.1 ± 8.1	Great White
$\pm s_{\bar{x}}$	7.2	5.9		
V%	28.4	26.2		
\bar{X}	273.1	328.1	300.2 ± 7.2	Duroc
$\pm s_{\bar{x}}$	11.2	7.8		
V%	19.6	32.4		
\bar{X}	322.7	355.0	338.2	
$\pm s_{\bar{x}}$	11.2	9.6	9.8	
V%	21.4	27.6	24.3	

The individual values of semen concentration in spermatozoon ranged between 244.0 ± 7.1 million/ml and 457.3 ± 5.6 million/ml.

The action of high temperatures in summer season on spermatogenesis caused significant decrease in the number of gametes / ml.

Concentration values fell to 57.6 million sperm / ml compared to peak in autumn (tab. 5). Taking account of these oscillations is necessary to evaluate each ejaculate in part to avoid a concentration of lower doses of sperm that may compromise the fertility of sows [6].

Table 5 The seasonal variation of semen concentration in spermatozoon (millions/ml)

Statistical parameters	Season				Average
	Winter	Spring	Summer	Autumn	
\bar{X}	341.8	327.8	313.6	371.2	338.2
$\pm s_{\bar{x}}$	9.2	10.4	11.1	12.6	10.2
V%	22.2	24.7	19.9	26.2	27.3

The average daily sperm production was close at the races studied, with insignificantly differences between them (tab. 6). For all races, young boars average daily sperm

production was lower than in the adults. The biggest differences between the two age groups were the Landrace breed.

Table 6 The average daily sperm production in function on the race and age (billions)

Statistical parameters	Age (months)		Average	Race
	8-18	19 - 31		
\bar{X}	16.0	22.3	19.1±0.2	Landrace
$\pm s_{\bar{x}}$	0.2	0.5		
V%	22.5	28.4		
\bar{X}	11.5	15.7	13.6±0.3	Great White
$\pm s_{\bar{x}}$	0.3	0.4		
V%	18.6	21.7		
\bar{X}	11.2	17.2	14.4±0.5	Duroc
$\pm s_{\bar{x}}$	0.3	0.2		
V%	26.2	21.3		
\bar{X}	13.1	18.3	15.7	
$\pm s_{\bar{x}}$	0.3	0.5	0.4	
V%	27.5	22.3	27.3	

In function by the individual, the average daily sperm production varied greatly. The limit values were: 8.6 billion and 22.5 billion

(Table 7). These values show that sperm production is highly genetically conditioned.

Table 7 The individual dynamics of average daily sperm production (billions)

The boars	Registration number	\bar{X}	$\pm s_{\bar{x}}$	V%
L	3860	19,6	0,2	26,4
L	3861	12,5	0,4	18,7
L	4809	20,5	0,1	25,2
L	8809	22,5	0,6	27,1
L	8021	18,8	0,1	19,8
Average L		19,6	0,5	30,1
GW	5519	13,3	0,2	27,4
GW	5889	14,4	0,4	19,6
GW	6020	12,0	0,4	31,0
GW	5904	15,3	0,3	27,4
GW	5818	12,8	0,1	16,4
Average GW		13,6	0,3	18,9
D	8511	14,4	0,6	25,7
D	5406	17,3	0,4	22,4
D	5350	14,9	0,4	20,6
D	5420	8,6	0,3	19,9
D	5410	15,7	0,5	26,8
Average D		14,2	0,6	30,2
AVERAGE		15,7	0,2	27,3

L – Landrace; MA – Great White; D – Duroc;

Because the warm season caused the reduced of volume and spermatozoon concentration, in this season was recorded

and the lowest average daily sperm production (tab. 8).

Table 8 The seasonal dynamic of the average daily sperm production (billions)

Statistical parameters	Sezon				Average
	Winter	Spring	Summer	Autumn	
\bar{X}	16,7	15,8	12,5	17,4	15,7
$\pm s_{\bar{x}}$	0,3	0,2	0,2	0,5	0,4
V%	22,7	19,1	20,9	29,8	29,5

CONCLUSIONS

The semen volume, sperm concentration and average daily sperm production are higher in comparison with the values cited in the literature for exploit breeds and hybrids in Romania. This production on the sperm ensures the obtaining, on average, 18 doses / ejaculate.

The factors environmental internal such as the race, age and individuality more influences the average daily sperm production and less the mobility.

The values of the spermogram indices were lower in summer, heat stress having a negative effect on spermatogenesis.

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