

EFFECT OF WORM AND COLD PERIOD OF THE YEAR ON BOAR SEMEN QUALITY PARAMETERS*

BLAGOJE STANČIĆ, ALEKSANDAR BOŽIĆ, IVAN STANČIĆ,
SAŠA DRAGIN, IVAN RADOVIĆ, MILICA PETROVIĆ¹

SUMMARY: The effects of various seasons of the year on boars semen quality parameters were investigated on intensive swine production farms in the Autonomous Province of Vojvodina, Serbia. The total of 30 Large White AI boars were investigated, within one year. Two ejaculates per boar per month were investigated (total 720 ejaculates per year). The average ejaculate volume in the June-July-August and September-October-November season (213ml and 232ml), sperm concentration (220 and 210x10⁶/ml) and total sperm number per ejaculate (46,8 and 48,7x10⁹), were significant (P<0,01) lower compared with December-January-February (293ml, 319x10⁶/ml, 93,5x10⁹) and March-April-May season (285ml, 284x10⁶/ml, 80,9x10⁹). The percentage of poor ejaculates significantly increase in the warmer season (31,8% i 21,4%), compared with colder season (10% i 16,7%). Due to lower values of ejaculate parameters, fewer doses may be made from one ejaculate in the warmer season. These facts should be taken into consideration when planning the intensity of boar reproductive exploitation in the warmer and colder season of the year.

Key words: season, semen, parameters, quality, boar.

INTRODUCTION

Number of doses per ejaculate is influenced by values of ejaculate parameters quality, such as volume, sperm concentration, total number of sperm in ejaculate and progressive motility (Tardif i sar., 1999; Stančić i sar., 2003; Knox, 2004). Season of

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¹Blagoje Stančić, PhD, full professor, Aleksandar Božić, PhD, full professor, Ivan Stančić, DVM, PhD, docent, Saša Dragin, PhD, docent, Ivan Radović, PhD, docent, University of Novi Sad (Serbia), Faculty of Agriculture. Milica Petrović, PhD., full professor, University of Belgrade (Serbia), Faculty of Agriculture.

Corresponding author: Blagoje Stančić, Faculty of Agriculture, Trg D. Obradovića 8, 21000 Novi Sad, Serbia; E-mail: blagoje.stancic@gmail.com; Phone: +381 21 485-3496.

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the year is one of the most important factor that influence semen parameters quality variations. It has been demonstrated that increasing of ambiental temperature in the warmer season is the most important factor that influence the decreasing of boar sperm production (Colenbrander i sar., 1990; Setchell, 1998; Corcuera i sar., 2002; Stančić i sar., 2003). The result is decreasing in boar reproduction exploitation on the one hand, and decreasing in sows fertility rate in the warmer season on the other hand (Stančić i sar., 2003; Okere, 2003).

The aim of this paper is to determine the effects of seasons on the main parameters of fertilization capacity in boar ejaculates, which are used for practical artificial insemination on swine farms in Vojvodina

MATERIALS AND METHODS

The researches were conducted on large swine farm in the Autonomous Province of Vojvodina, Serbia. During the period of one year (from January 2012 to December 2012), 2 ejaculates per boar were tested monthly, collected from 30 Large White boars, ranging from 2 to 2,5 years of age. Consequently, 720 ejaculates were tested in total.

Immediately after the collection on farm, the volume of each ejaculate was determined (ml) and the ejaculates were transported to the laboratory in air-conditioned boxes for boar semen (Minitüb) at +17°C. The ejaculates were heated up to +37°C in the laboratory.

The following parameters were determined for each ejaculate in laboratory: (1) the volume (ml), (2) the sperm concentration ($\times 10^6/\text{ml}$), (3) the total sperm count per ejaculate, and (4) the progressive sperm motility. The sperm concentration, the total sperm count, the number of insemination doses, and the level of required dissolution were determined by the photometer SDM5 (Minitüb, Germany). The progressive sperm motility was determined by a light microscope under the medium power magnification. The ejaculates with the progressive sperm motility $< 65\%$ were considered as poor for using in artificial insemination. The possible doses number per ejaculate were calculated with 4×10^9 motile spermatozoa in 100ml diluted semen dose. The data were processed by *Statistica 10* software.

RESULTS AND DISKUSSION

The average ejaculate parameters was: Volume = 253ml, spermatozoa concentration = $254 \times 10^6/\text{ml}$, total spermatozoa number = $65,7 \times 10^9$ and progressive motility = 78% (Table 1).

Table 1. Boars native sperm parameters
 Tabela 1. Parametri nativne sperme nerastova

Ejaculate parameters Parametri ejakulata	Months of year / Meseci u godini				Ukupno (n=720)
	D-J-F (n=180)	M-A-M (n=180)	J-J-A (n=180)	S-O-N (n=180)	
Volume Volumen (ml)	293A	285A	213B	232B	253
Sperm concentration Konc. spz. (x06/ml)	319A	284A	220B	210B	254
Total sperm No./ejaculat Ukupan br. spz./ejaculat (x10 ⁹)	93,5A	80,9A	46,8B	48,7B	65,7
Prog. motility Progr. pokret. (%)	85A	85A	75A	70B	78
Bad ejaculates Loših ejakulata*	24/10%A	44/16,7%A	84/31,8%B	72/21,4%B	224/20,3%
Possible No. AI doses per ejaculate Moguć br. VO doza po ejakulatu	20A	17A	9B	8,5B	13
Required deluting degree Potreban stepen razredenja	1:7A	1:6A	1:4B	1:4B	1:5

n – Number of ejaculates / broj ejakulata;

* < 65% progressive motile spermatozoa per ejaculate / < 65% progresivno pokretnih spermatozoida u ejakulatu (n/%)

Average ejaculate volume (213ml and 232ml), sperm concentration (220 and 210x10⁶/ ml) and total sperm number per ejaculate (46,8 i 48,7x10⁹) was significantly lower (P<0,01) i the period June-July-August and September-October-November, compared with the period December-January-February (293ml, 319x10⁶/ml, 93,5x10⁹) and period March-April-May (285ml, 284x10⁶/ml, 80,9x10⁹). The percentage of poor ejaculates significantly increase in the warmer season (31,8% i 21,4%), compared with colder season (10% i 16,7%). Therefore, in the warmer period of the year, it is possible to made significant lower number of doses per ejaculate (9 and 8.5), compared with in the colder period (20 i 17 doses) (Table 1).

The decreasing value of boar ejaculate parameters in the warmer season of the year has not been entirely clarified. The variation of ejaculate parameters quality can be influenced by many factors, such as breed, individual boar, age of boar, semen collection frequency, ambient temperature, daily photoperiod and some diseases (Colenbrander i sar., 1990; Stančić i sar., 2003; Wolf i Smital, 2009; Gerfen et al., 1994; Ciereszko et al., 2000; Jankevičiute and Žilinskas, 2002; Stančić et al., 2003; Smital et al., 2004; Chukwuemeka et al., 2005). However, based on the recently studies, this decreasing is mainly influenced by increased ambient temperature (Suriyasomboon et al., 2004) and prolonged daily photoperiod (Sancho et al., 2004) in warmer seasons, that reduce the process of spermatogenesis and testosterone synthesis. Furthermore, some researches indicate that this could be due to the genetic inheritance passed from wild progenitors to domesticated breeds. It is a well-known fact that wild boars demonstrate

extreme sexual activity seasonally and provide the best sperm quality during mating seasons, which last from late autumn to early winter (Kozdrowski and Dubiel, 2004; Macchi et al., 2010). The results of our researches indicate that the value parameters of sperm fertilisation capacity were significantly higher during cooler periods of the year in comparison with warmer seasons. Various authors have also obtained similar results which confirmed the influence of warm seasons on the reduction of the value parameters of sperm fertilisation capacity in boars (Liao et al., 1996; Kunavongkrit et al., 2005; Ciereszko et al., 2000; Jankevičiute and Žilinskas, 2002; Chukwuemeka et al., 2005).

The obtained results can enhance the reproductive efficiency in boar during cooler and warmer periods of the year on large farms in Vojvodina.

CONCLUSION

The results of our investigations demonstrate that there are significant variations in boars ejaculate parameters value, within the seasons of the year. The ejaculate volume, the sperm concentration, the total sperm count and the progressive sperm motility are significantly lower during warmer seasons of the year, and hence the number of obtained insemination doses per ejaculate is almost twice as small as the number of obtained doses in cooler seasons.

These facts should be taken into consideration when planning the intensity of boar reproductive exploitation under production conditions. Therefore, it is possible to significantly reduce the negative effects of warmer seasons on sow fertility.

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UTICAJ TOPLOG I HLADNOG PERIODA GODINE NA PARAMETRE KVALITETA SPERME NERASTA

BLAGOJE STANČIĆ, ALEKSANDAR BOŽIĆ, IVAN STANČIĆ,
SAŠA DRAGIN, IVAN RADOVIĆ, MILICA PETROVIĆ

Izvod

Ispitivan je uticaj različitih godišnjih sezona na parametre kvaliteta sperme nerastova na farmama intenzivne proizvodnje svinja u PA Vojvodini (Srbija). Ispitano je ukupno 720 ejakulata (2 ejakulata po nerastu mesečno), od 30 nerastova rase Veliki jorkšir, koji se koriste za VO. Tokom perioda Jun-Jul-Avgust i Septembar-Okotobar-Novembar, prosečan volumen ejakulata (213ml and 232ml), koncentracija spermatozoida (220 and 210×10⁶/ ml) i ukupan broj spermatozoida u ejakulatu (46,8 and 48,7×10⁹), bili su značajno niži (P<0,01) u poređenju sa sezonom Decembar-Januar-Februar (293ml,

319x10⁶/ml, 93,5x10⁹) i Mart-April-Maj (285ml, 284x10⁶/ml, 80,9x10⁹). Procent loših ejakulata je bio znatno veći u toplijem delu godine (31,8% i 21,4%), u poređenju sa hladnijim delom godine (10% i 16,7%). Zbog znatno nižih vrednosti parametara kvaliteta ejakulata, tokom toplijeg dela godine je moguće praviti manji broj inseminacionih doza po ejakulatu. Ovo treba uzeti u obzir prilikom planiranja reproduktivne eksploatacije nerastova u toplijem periodu godine.

Ključne reči : sezona, ejakulat, parametri, kvalitet, nerast.

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