

Effect on Fertilizing Capacity According to Sperm Concentration of Liquid Boar Semen

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ABSTRACT

This study was carried out to find out the effect on fertilizing capacity according to sperm concentration of liquid boar semen. Four different doses with various motile sperm cells of 3.0×10^9 , 2.5×10^9 , 2.0×10^9 , and 1.5×10^9 per 80ml plastic bottle were inseminated twice 12 h interval after standing estrus in 6,818 sows.

Farrowing rate and total piglets per litter were 82.2% and 10.9, respectively, with no significant differences among the other treatments. The presumption of optimal concentration of motile sperm cells in the liquid boar semen was best at $2.0 \sim 2.3 \times 10^9$ per dose.

(Key words : Porcine, Liquid boar semen, Sperm cells, Farrowing rate, Litter size)

I. INTRODUCTION

Porcine artificial insemination (AI) using liquid semen requires about $2.0 \sim 3.0 \times 10^9$ sperm cells per dose of 70~80 ml (Crabo, 1991). Recently, numbers of sperm per dose was tested by other researchers (Weitze, 1991; Gordon, 1997; Mercat et al., 1999; Rath et al., 1999).

The minimum number of sperm cells per dose of the liquid semen produced by commercial AI centers in Korea is 3.0×10^9 .

This study was carried out to find out the effect on fertilizing capacity according to sperm concentration of liquid boar semen.

II. MATERIALS AND METHODS

A total of 6,818 sows bred by AI in 56 commercial swine farms was used for this study.

Liquid semen from 34 boars (Duroc: 5, Landrace: 15, Large Yorkshire: 14) raised in the National Livestock Research Institute AI Center in Seunghwan-eup, Chungnam, were distributed to swine farms.

Semen was collected twice a week by the gloved-hand technique. The sperm-rich fraction of ejaculates with greater than 85% motile sperm were used in this experiments.

The percentage of motile sperm was estimated through a phase-contrast microscope at $100 \times$ and $200 \times$ with 37°C warm plate and sperm concentration was estimated with Spectronic-20 (Bausch & Lomb Co., USA).

Four different dose with various motile sperm cells of 3.0×10^9 , 2.5×10^9 , 2.0×10^9 , and 1.5×10^9 per 80 ml plastic bottle were prepared to AI. Beltsville Thawing Solution (BTS) was used for a semen extender and antibiotics were not added.

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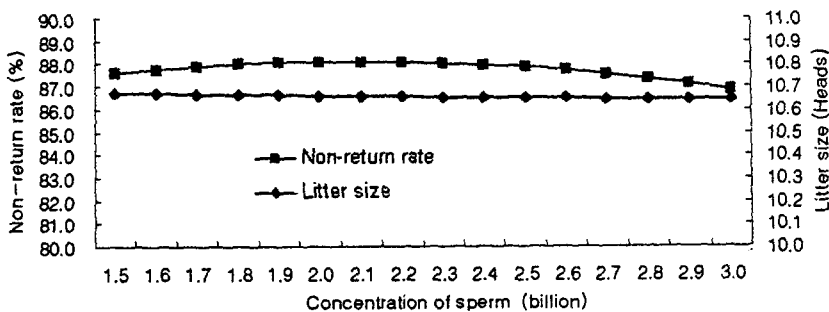


Fig. 1. The presumption of optimal concentration of motile sperm cells.

Preservation container for transport and storage of liquid semen were maintained in 16~18 °C. Insemination of liquid semen was performed twice a day with an interval of 12h by farmers. Artificial insemination was done from April 1997 to October 1997.

The data were analyzed with a SAS statistics program.

III. RESULTS AND DISCUSSION

The results of farrowing rate and litter size by the numbers of motile sperm cells per dose in AI of liquid boar semen are shown in Table 1. The highest farrowing rate (84.5%) with 2.5×10^9 per dose did not differ significantly from the remaining treatments.

The litter size was also not influenced by re-

duction of motile sperm cells in AI from 3.0×10^9 cells to 1.5×10^9 cells per dose.

As shown in Fig. 1, the presumption of optimal concentration of motile sperm cells in the liquid boar semen was best at $2.0 \sim 2.3 \times 10^9$ per dose.

A sperm dose of $2.0 \sim 3.0 \times 10^9$ per artificial insemination is commonly used in a diluent volume of 70 ml (Gordon, 1997). Sweden AI center usually contains $2.0 \sim 3.0 \times 10^9$ sperm and American AI centers usually dispense $4.0 \sim 6.0 \times 10^9$ sperm per dose (Crabo, 1991).

In this study, the reduction of motile sperm cells from 3.0×10^9 to 1.5×10^9 had no effect on farrowing rate and on litter size. These data were similar with the results of fertility and total piglets per litter obtained by Steverink et al. (1997), Mercat(1999) and Rath et al.(1999)

Table 1. Fertility results after AI with liquid boar semen (16~18°C) using different number of sperm cells per dose

	Number of motile sperm per dose ($\times 10^9$ /80ml)			
	3.0	2.5	2.0	1.5
No. of sows, head	3,757	1,123	1,078	860
Non-return rate, %	87.0	87.6	87.8	86.1
Farrowing rate, %	82.7	84.5	82.3	82.2
Litter size (total born), head	10.7	10.9	10.6	10.9
Litter size (live born), head	10.0	10.1	9.9	10.1

from 1.0×10^9 to 6.0×10^9 sperm cells.

In conclusion, farrowing rate and litter size inseminated with 1.5×10^9 sperm did not differ as compared with those inseminated with higher sperm concentrations. Further study will be needed for examination of the lowest sperm cell number that do not affect reproductive performance in liquid boar semen.

IV. REFERENCES

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요 약

돼지 액상정액의 정자농도가 번식성적에 미치는 영향

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본 연구는 돼지 액상정액의 주입농도가 번식성적에 미치는 영향을 구명하기 위하여 실시하였다.

1회 주입 정자수를 80ml 병당 3.0×10^9 , 2.5×10^9 , 2.0×10^9 및 1.5×10^9 으로 구분하여 인공 수정한 결과 주입 정자 농도가 1.5×10^9 일 경우 분만을 82.2%, 총산자수 10.9두로 나타났으며 처리별 농도간에 통계적인 유의차가 없었다. 또한 1회 적정 주입 정자농도를 추정한 결과 $2.0 \sim 2.3 \times 10^9$ 으로 나타났다.

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