



## EFFECT OF NUMBER OF SPERM PER INSEMINATION ON FARROWING RATE AND LITTER SIZE IN YORKSHIRE SOW

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### ABSTRACT

Semen was collected from Large White Yorkshire (LWY) boars by gloved - hand technique twice weekly and extended in Beltsville Thawing Solution (BTS) keeping  $3 \times 10^9$  and  $4 \times 10^9$  sperm per insemination dose of 100 ml volume. The diluted semen was packed in cotchette and preserved at  $18^{\circ}\text{C}$  in BOD incubator and was used for insemination within 3 days of storage. Single insemination was done using sponge tip 'Golden pig' catheter in 56 and 57 oestrous female pigs with preserved semen containing  $3 \times 10^9$  and  $4 \times 10^9$  sperm per insemination respectively on the 3<sup>rd</sup> day of oestrus ( Day of onset of oestrus was the first day of oestrus). The farrowing rate was 64.91 and 64.30 per cent for  $3 \times 10^9$  and  $4 \times 10^9$  sperm per insemination dose respectively, the difference being not significant. The mean litter size was found to be  $7.92 \pm 0.32$  and  $7.94 \pm 0.39$  respectively, the difference being non-significant. It could be concluded from the study that  $3 \times 10^9$  sperm rather than  $4 \times 10^9$  sperm per inseminate is recommended for economical use of semen as the number of spermatozoa under studied did not have significant effect on the farrowing rate and litter size in LWY sow .

**Keywords:** sperm number, insemination, farrowing rate, liter size, sow

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### INTRODUCTION

The number of spermatozoa played an important role in fertilization, because fertility improved with increase in number of spermatozoa delivered up to a certain threshold. The threshold varied with semen quality and the differences in fertility between semen treatments (i.e. extender, age of semen) could only be revealed when number of spermatozoa in the inseminate was below the threshold values. In general, the number of spermatozoa per insemination dose in pig was recommended to be at least  $3 \times 10^9$ . However, there existed the difference in opinion with regard to the optimum number of sperm per dose although lowering the number of spermatozoa per dose was not widely recommended. The sperm number per insemination commonly used in the state of Mizoram is 3 or 4 billions sperm but the difference of one billion may effect the economical use of

boar semen. The present study was, therefore, conducted to investigate the effect of number of sperm per inseminate on the farrowing rate and litter size in LWY sows.

### MATERIALS AND METHOD

Semen was collected twice a week from seven LWY boars maintained at Semen Collection Centre, Govt. of Mizoram, Selesih, Aizawl by gloved hand technique using a dummy as mount. The collected semen was strained through filter gauze into a graduated collecting beaker. A total of 24 ejaculates collected was extended in Beltsville Thawing Solution (BTS) keeping  $3 \times 10^9$  and  $4 \times 10^9$  sperm per insemination dose in 100 ml volume. The diluted semen was packed in cottle and stored at  $18^\circ\text{C}$  in BOD incubator and used within three days of storage. A total of 113 pigs comprising 56 and 57 oestrous female pigs were inseminated using sponge tip 'Golden pig' catheter on the third day of detection of oestrus with preserved semen containing  $3 \times 10^9$  and  $4 \times 10^9$  sperm per insemination respectively. The farrowing rate and litter size at birth were recorded. Statistical analyses were done as per Snedecor and Cochran (1967).

### RESULTS AND DISCUSSION

The effect of sperm number per insemination dose on farrowing rate in female pig is given in (Table 1).

The farrowing rates recorded in the present study were in agreement with the report of 65.9 per cent (Johnson *et al.* 1980) on insemination with 2<sup>nd</sup> day stored semen at  $18^\circ\text{C}$ ; 63.2 and 60 per cent with 0 day and 2 day stored semen in BL-1 diluent respectively (Paquignon *et al.*, 1981), 64.7 per cent (Johnson *et al.*, 1982 a) with semen stored for 3 days and 67.31 per cent (Pelland *et al.*, 2008) in single insemination with  $3 \times 10^9$  sperm. The farrowing rate in the present finding was lower than the report of earlier workers (Jansen *et al.*, 2007 and Hernandez-Caravaca *et al.*, 2008).

**TABLE 1: EFFECT OF SPERM NUMBER PER INSEMINATION DOSE ON FARROWING RATE IN LARGE WHITE YORKSHIRE SOWS**

Sperm No./dose	No. of sows inseminated	No. of sows farrowed	Farrowing rate (%)	Chi-Square value
$3 \times 10^9$	56	36	64.30	6.5850E-05 <sup>NS</sup>
$4 \times 10^9$	57	37	64.91	
Total	113	73	64.60	

<sup>NS</sup> Non-significant

**TABLE 2: EFFECT OF SPERM NUMBER PER INSEMINATION DOSE ON LITTER SIZE IN LARGE WHITE YORKSHIRE SOWS**

Sperm number/AI dose	No. of farrowing	Litter size	't' value
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		Mean $\pm$ SE	Range	
3x10 <sup>9</sup>	36	7.94 $\pm$ 0.39	2 - 16	0.0501 <sup>NS</sup>
4x10 <sup>9</sup>	37	7.92 $\pm$ 0.32	3 - 14	

<sup>NS</sup> Non-significant

The difference in farrowing rates might be due to the difference in the number of inseminations since Bracken *et al.* (2003) reported that a single insemination with  $3 \times 10^9$  sperm resulted in farrowing rate of only 56.5 per cent whereas double insemination resulted in farrowing rate 77.2 per cent. It might also be due to the time of A.I. and due to the difference in the management of pigs since the present work was carried out in the field condition under indigenous system of rearing.

There was no significant difference of farrowing rate between the two numbers of sperm per insemination (Table 1). This was in agreement with the findings of Sergeev (1963) with sperm number of  $1 \times 10^9$ ,  $2.5 \times 10^9$  and  $5 \times 10^9$  sperm/insemination; with 2.5, 5.0 and 10 billion of sperm/inseminate (Stratman and Self, 1968), with  $2 - 2.5 \times 10^9$  and  $4 - 5 \times 10^9$  sperm/dose (Meding, 1978), with  $2.5 \times 10^9$  and  $5 \times 10^9$  sperm/70 ml of BTS extender (Machaty *et al.*, 1992), with  $1 \times 10^9$ ,  $3 \times 10^9$  and  $6 \times 10^9$  sperm/80 ml of inseminate (Steverink *et al.*, 1997), with  $3 \times 10^9$  or  $0.3 \times 10^9$  sperm/70ml BTS diluent (Tardif *et al.*, 1999) and with  $1.5 \times 10^9$ ,  $2 \times 10^9$ ,  $2.5 \times 10^9$  and  $3 \times 10^9$  sperm per inseminate (Park *et al.*, 2000).

The effect of sperm number per insemination dose on litter size in Yorkshire pigs is furnished in Table 2.

In the present study, the mean live-born piglet from 36 sows inseminated with  $3 \times 10^9$  sperm per insemination was  $7.94 \pm 0.39$  with a range of 2-16 and it was  $7.92 \pm 0.32$  with a range of 3-14 in 37 sows inseminated with  $4 \times 10^9$  sperm per insemination. The litter size in the present study was comparable with the reports of earlier workers (Kudlac *et al.*, 1978 and Kadirvel *et al.*, 2004) and was higher than the report of 6.1 (Tyngkan, 2009) in Hampshire.

There was no significant difference of the litter size due to sperm number of  $3 \times 10^9$  and  $4 \times 10^9$  per inseminate. This was in accordance with the reports of Machaty *et al.* (1992) who used  $2.5 \times 10^9$  and  $5 \times 10^9$  sperm per inseminate; Park *et al.* (2000) using  $1.5$ ,  $2$ ,  $2.5$  and  $3 \times 10^9$  sperm/dose and Garcia *et al.* (2007) using  $1.25 \times 10^9$  to  $2.5 \times 10^9$  sperm per insemination. In contrast to the present finding, a significant difference of litter size due to difference in number of sperm per inseminate was reported by Tardif *et al.* (1999) with  $3 \times 10^9$  and  $0.3 \times 10^9$  sperm per inseminate and Poolperm (2001) with  $\geq 3 \times 10^9$  and  $< 3 \times 10^9$  sperm per inseminate.

It could be concluded from the study that  $3 \times 10^9$  sperm rather than  $4 \times 10^9$  sperm per inseminate is recommended for economical use of semen as the number of spermatozoa under studied did not have significant effect on the farrowing rate and litter size in LWY sow .

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