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## Artificial insemination in pig

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**Abstract**

Artificial insemination (AI) of swine is a very useful, cheap and practical tool to introduce superior genes into sow herds. Boars were trained and semen was collected by Simple fist method. Semen was evaluated, extended @ 1:4 in Modena extender and preserved for four days at 15°C in BOD incubator. The service behaviour such as latency to mount, reaction time and ejaculation time was 1.24±0.29, 2.45±0.22 and 7.13±0.55 minutes respectively. Among the seminal characteristics, the volume of gel mass, strained volume and total ejaculate volume was 38.60±3.92, 237.7±14.29 and 276.3±15.63 ml respectively. The sperm concentration was found to be 334.7±27.27 million/ml. Initial sperm motility and live sperm was 85.50±3.37 and 92.36±1.76 per cent respectively. Artificial insemination with preserved semen of different hours were performed which resulted litter size varied from 5 to 16 with an average of 9.42. It can be concluded that the artificial insemination in pig under field condition can effectively be done with liquid semen preserved up to four days at 15°C.

**Keywords:** artificial insemination, boar, collection, preservation, semen

**1. Introduction**

Artificial insemination (AI) of pig is a very useful, cheap and practical tool to introduce superior genes into sow herds with minimal risk for disease transmission. The demand of pork is increasing rapidly in the North-East. Though pig is reared traditionally by the local people of Assam, but most of them are small-scale farmers. AI allows small-scale raisers to keep a few sows without maintaining a boar and breeding of females from distant places with less transport costs and inconvenience, and without causing travel-related stress on the boar. The success of AI is largely determined by the semen quality and the insemination procedure. Critical issues for AI involve collection of semen, semen evaluation, preservation of semen, detection of heat and applying strict hygiene measures. Although a number of investigators (Bhuyan *et. al.* 1991<sup>[1]</sup>; Chutia *et. al.*, 2014<sup>[2]</sup>; Deka, 2011<sup>[3]</sup>) worked on boar semen and artificial insemination, most of the pig farmers do not know about the AI in pig and its beneficial effects. The present work has been undertaken to popularize AI in pig and to upgrade the local stock through AI with improved germplasm in different parts of Assam.

**2. Materials and Methods****2.1 Collection of semen**

Four 50 per cent Hampshire cross boars of 8-10 months age were trained for semen collection using a fixed iron dummy. Boars were trained daily in the morning using mimicking breeding sounds and mucous of estrous female rubbed on the dummy. The service behaviour such as latency to mount, reaction time and ejaculation time was recorded at the time of semen collection. Semen was collected by Simple fist method (Tamuli, 1982)<sup>[4]</sup> in a pre-warmed (37°C) thermos flask and the gel mass was separated by allowing the semen to pass through a Buchner funnel at the time of semen collection.

**2.2 Semen evaluation**

Semen was brought to the laboratory in the thermos flask immediately after collection. Among the seminal characteristics, the volume of gel mass, strained volume and total ejaculate volume was measured in graduated glass cylinder. The sperm concentration was counted by using haemocytometer. Initial sperm motility was calculated by placing a drop of semen on a clean glass slide and cover slip was placed over the drop and examined under microscope at a magnification of 400X. The per cent of live sperm was calculated using Eosin-Nigrosin stain (Blom, 1950)<sup>[5]</sup>.

### 2.3 Preservation of semen

The semen samples having more than 85 per cent initial sperm motility and live sperm having minimum sperm concentration of 200 million/ml were used for preservation. The suitable semen samples were diluted with Modena extender (Moretti J, 1981<sup>[6]</sup>) @ 1:4 and hold for four hours in incubator at 22° C. After the holding period, the semen samples were preserved in BOD incubator at 15°C. For artificial insemination, semen doses were prepared in plastic sachets procured from IMV Technologies, France. 75 to 100 ml of extended semen containing 2.5 to 3.0 billion motile sperm was maintained in a semen dose. The semen was transported in a specialized cool cabinet operating at 15° to 18° C or an insulated box to the field for artificial insemination.



Fig 1: Preservation of boar semen (A.I. doses) in a BOD incubator.

### 2.4 Detection of heat

Ostrous was detected by observing the signs like pinkish, swollen vulva with enlarged clitoris; elevation of ear (pinning ear); immobilization or lordosis response; decreased appetite, restlessness; frequent urination and increased vocalization etc. The length of the estrous cycle is about 21 days (range 18-23 days). Gilts and sows were inseminated 24 to 30 hours after estrous begins and sometimes second insemination was also done after 12 hours of the first one.

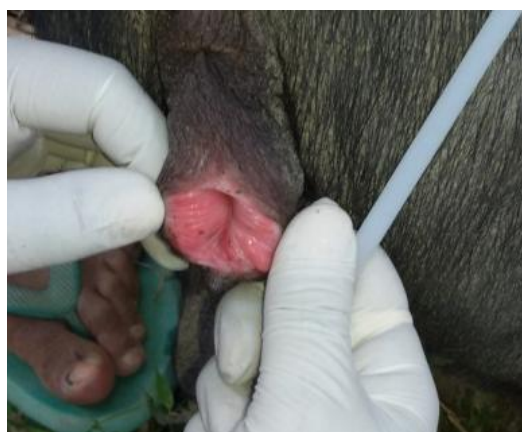


Fig 2: Pinkish vulva

### 2.5 Artificial Insemination

Before inseminating the female, the vulva was cleaned by using a paper towel. The tip of the Golden pig catheter (IMV Technologies, France) was lubricated using nonspermicidal lubricant or a few drops of extended semen. The tip of the catheter was inserted into the vulva and gently pushed forward and upward at 45° angles into the reproductive tract

until resistance is felt. The tip of the sachet was cut and firmly fit to the open end of the catheter. The sachet was raised over the sow's back and dispensed the diluted semen by gently squeezing the sachet over 3 to 5 minutes period. The catheter was withdrawn gently and the animal was kept in quite surroundings for 20-30 minutes.

The boars were reared in AICRP on pig, Khanapara maintaining hygienic conditions that fulfill the norms required under Institutional Animal Ethics Committee.



Fig 3: Deposition of extended and preserved semen in a female pig with an AI catheter.



Fig 4: AI born piglets under field condition.

## 3. Results and Discussion

### 3.1 Service behaviour

Among the service behaviour, the mean latency to mount in boar was found to be  $1.24 \pm 0.29$  minutes with a range from 0.3-3.2 minutes. The mean reaction time was  $2.45 \pm 0.22$  minutes with a range from 1.29-3.5 minutes and the mean ejaculation time was  $7.13 \pm 0.55$  minutes with a range from 4.8-10.4 minutes. The mean latency to mount was in close conformity but the reaction time and ejaculation time was slightly higher than the values in Hampshire boars reported by Chutia (2010)<sup>[7]</sup>

### 3.2 Seminal attributes

#### 3.2.1 Volume of gel mas

The mean value of volume of gel mass was  $38.60 \pm 3.92$  ml with a range from 21-58 ml. the present finding was in close conformity with the observations on volume of gel mass in Hampshire boars reported by Chutia (2010)<sup>[7]</sup>.

#### 3.2.2 Strained volume

The mean value of strained volume was  $237.70 \pm 14.29$  ml with a range from 163-310 ml. The present figure on strained volume was higher than that observed by Kantharaj and Athman (2009)<sup>[8]</sup>.

### 3.2.3 Total ejaculate volume

The mean value of total ejaculate volume was  $276.30 \pm 15.63$  ml with a range from 199-349 ml. The present findings were in close conformity with the observations on total ejaculate volume in boars as documented in the reports of Teles *et al.* (2016) <sup>[9]</sup> but higher than that observed by Kantharaj and Athman (2009) <sup>[8]</sup>.

### 3.2.4 Concentration

The mean concentration of semen in boar was found to be  $334.70 \pm 27.27$  million/ml with a range from 273-446 million/ml. The present figure was higher than that observed in Large White Yorkshire boar by Chutia *et al.* (2017) <sup>[10]</sup>, Kantharaj and Athman (2009) <sup>[8]</sup> and Teles *et al.* (2016) <sup>[9]</sup>. However, the present finding was lower than the values observed in duroc boars by Gorsky *et al.* (2017) <sup>[11]</sup>.

### 3.2.5 Initial sperm motility

The mean value of initial sperm motility was  $85.50 \pm 3.37$  per cent with a range from 65-95 per cent. The present figure was higher than that observed in Large White Yorkshire boar by Chutia *et al.* (2017) <sup>[10]</sup>, Kantharaj and Athman (2009) <sup>[8]</sup> but lower than in crossbred boars (Harbin White x Long White) as reported by Zou and Yang (2000) <sup>[12]</sup>.

### 3.2.6 Live sperm

The mean value of live sperm was  $92.36 \pm 1.76$  per cent with a range from 80.48-98.56 per cent.

The present findings on live sperm was in agreement with Zou and Yang (2000) <sup>[12]</sup> in crossbred boars (Harbin White x Long White) but higher than that observed in Large White Yorkshire boar by Chutia *et al.* (2017) <sup>[10]</sup> and Kantharaj and Athman (2009) <sup>[8]</sup>.

The variations in finding might be due to the difference in breed, age and body weight of the boars, frequency and procedure of semen collection and environmental and managemental factors.

Semen samples up to 96 hours of preservation in BOD incubator at 15°C showed more than 50 per cent sperm motility and live sperm.

### 3.3 Artificial insemination

Artificial insemination with diluted semen of different hours of preservation was done in different parts of Assam. Maximum litter size of 16 was obtained with semen preserved for two days and semen of four days resulted maximum litter size of 12. Litter size varied from 5 to 16 with an average of 9.42 which was higher than the values reported by Chutia *et al.* (2014) <sup>[2]</sup>. The conception rate in pigs was found to be above 80 per cent which was in agreement with the findings of Chutia *et al.* (2014) <sup>[2]</sup>.

### 4. Conclusion

From the results of the present investigation, it was concluded that, the service behaviour and seminal attributes of Hampshire cross boars were well comparable with other breeds of pig. The artificial insemination in pig under field condition can effectively be done with liquid semen preserved up to four days at 15°C.

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