Semen Characteristics of Hampshire Boar Semen During Preservation in Different Extenders at Liquid State*


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Quality of semen during preservation exerts influence on success of artificial insemination. Preservation of boar semen which is to be done at around 15-20°C (Dube et al., 2004) in view of its susceptibility to cooler temperature (Watson et al., 1981) has been attempted after a brief holding at higher temperature by different workers with varying degree of success. But there is no unanimity regarding the suitability of extenders for preserving boar semen in different conditions. Therefore, the present study was taken up to find out a suitable extender for preservation of Hampshire boar semen under our condition.

Materials and Methods

Three Hampshire boars aged 1-3 years maintained at the 30 - Sow Teaching Unit, Assam Agricultural University, Khanapara were used to study the effect of different extenders on quality of boar semen during preservation. Eighteen ejaculates collecting six from each boar by simple fist method using restrained gilt in a service crate as mount were utilized. Immediately after collection semen was taken in a 100 ml conical flask which was placed in a beaker containing warm water (30°C). The beaker was then kept in a BOD incubator at 24° C for 5 hours. After allowing 5 hours of holding time the semen was split into 3 parts and extended with (1 : 3). Beltsville Thawing Solution (BTS) (Pursel and Johnson, 1975), Kiev (Johnson et al., 1981) and Lactose Egg Yolk (LEY) (Park and Pursel, 1985) extenders respectively and preserved in 5 ml glass vials at 18°C in a BOD incubator for 96 hours. The preserved semen was evaluated for sperm motility, live sperm and intact acrosome following standard techniques at 0 (i.e., immediately after extension), 24, 48, 72 and 96 hours of preservation. Statistical analysis of the data obtained was carried out as per standard methods (Snedecor and Cochran, 1994).

Results and Discussion

The mean values of sperm motility, live sperm and intact acrosome in BTS, Kiev and LEY extenders for different hours of preservation at 18°C are presented in Table I.

The percentage of sperm motility on preservation was found to be higher in BTS than in Kiev and LEY, and in Kiev than in LEY extenders at 0 hour and 96 hours. The percentage of sperm motility was found to be significantly (P< 0.05) higher in BTS than in Kiev and LEY and in Kiev than in LEY extender irrespective of preservation period. Superior sperm motility in BTS in comparison with Kiev and LEY extenders was also recorded by Machaty et al. (1992). Higher sperm motility obtained in BTS and Kiev extenders on 96 hours of preservation as compared to LEY extender could be attributed to the synergistic action of EDTA, sodium citrate dihydrtae and sodium bicarbonate present in the two extenders which provided better buffering capacity. The component of glucose which was incorporated in both BTS and Kiev extenders could supply necessary energy to the sperm cells (Faulkner, 1971) for sustaining higher sperm motility. Absence of buffering and chelating agents in LEY could lead to an environment that was hostile for sperm survival. This might explain the absence of motile spermatozoa in
LYE extender on 96 hours of preservation.

The percentage of live sperm during preservation was recorded to be higher in BTS than in Kiev and LEY, and in Kiev than in LEY extender at 0 hour and 96 hours of preservation. The percentage of live sperm was found to be significantly (P< 0.05) higher in BTS than in Kiev and LEY, and in Kiev than in LEY extender irrespective of preservation period. The percentage of live sperm obtained in the present study was in close agreement with that of the earlier workers (Kantharaj and Athman, 2007), but higher than that recorded by Alexopoulos et al. (1996).

The overall mean percentages of sperm motility and live sperm were found to decrease significantly (P<0.05) with the increase in hour of preservation irrespective of extender. This could be due to progressive decline in nutrient with increase in period of preservation.

The percentage of intact acrosome during preservation was found to be higher in BTS than in Kiev and LEY, and in Kiev than in LEY extender at 0 and 96 hours of preservation. It was significantly (P<0.05) higher in BTS than in Kiev and LEY, and in Kiev than in LEY extender irrespective of preservation period.

Higher intact acrosome in BTS in comparison with that of Kiev and LEY extenders was also recorded by Machaty et al. (loc. cit). Higher incidence of intact acrosome obtained in BTS and Kiev extenders on 96 hours of preservation as compared to that in LEY extender could be ascribed to better biochemical milieu provided by the former two extenders that could render higher protective action for the acrosome. It was recorded that the overall mean percentage of intact acrosome decreased significantly (P<0.05) with the increase in hour of preservation irrespective of extender. Increase in phospholipids and cholesterol content was observed in the seminal plasma on storage and high concentration of these plasmatic components could cause destructive changes in sperm membranes (Dimitrov et al., 2009). This could account for the lower percentage of intact acrosome in spermatozoa with increase in duration of preservation.

In an effort to investigate the status of fertility of the semen preserved in BTS extender, a total of 14 females, 6 sows and 8 gilts, were inseminated with 80 - 100 ml of the preserved semen extended in BTS extender twice after 24 and 36 hours from the onset of oestrus using Golden pigs catheters. Ten females farrowed.

### Table I. Mean ± S.E of sperm motility, live sperm and intact acrosome in Hampshire boar semen in different extenders for different hours of preservation at 18°C

<table>
<thead>
<tr>
<th>Extender</th>
<th>Sperm motility (%)</th>
<th>Live sperm (%)</th>
<th>Intact acrosome (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hour of preservation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td>BTS</td>
<td>81.67 ± 0.57</td>
<td>78.33 ± 0.81</td>
<td>72.78 ± 0.92</td>
</tr>
<tr>
<td>Kiev</td>
<td>75.83 ± 1.09</td>
<td>69.17 ± 1.01</td>
<td>63.61 ± 1.33</td>
</tr>
<tr>
<td>LEY</td>
<td>71.38 ± 1.20</td>
<td>60.56 ± 1.27</td>
<td>47.78 ± 1.58</td>
</tr>
<tr>
<td>Overall</td>
<td>76.30 ± 0.81</td>
<td>69.40 ± 1.16</td>
<td>61.40 ± 1.60</td>
</tr>
</tbody>
</table>

Higher intact acrosome in BTS in comparison with that of Kiev and LEY extenders was also recorded by Machaty et al. (loc. cit). Higher incidence of intact acrosome obtained in BTS and Kiev extenders on 96 hours of preservation as compared to that in LEY extender could be ascribed to better biochemical milieu provided by the former two extenders that could render higher protective action for the acrosome. It was recorded that the overall mean percentage of intact acrosome decreased significantly (P<0.05) with the increase in hour of preservation irrespective of extender. Increase in phospholipids and cholesterol content was observed in the seminal plasma on storage and high concentration of these plasmatic components could cause destructive changes in sperm membranes (Dimitrov et al., 2009). This could account for the lower percentage of intact acrosome in spermatozoa with increase in duration of preservation.

In an effort to investigate the status of fertility of the semen preserved in BTS extender, a total of 14 females, 6 sows and 8 gilts, were inseminated with 80 - 100 ml of the preserved semen extended in BTS extender twice after 24 and 36 hours from the onset of oestrus using Golden pigs catheters. Ten females farrowed.
the rate of farrowing being 71.43 per cent which was in close agreement with that of Machaty et al. (loc. cit) and Kadirvel et al. (2004). However, the present findings were lower than that of Kantharaj and Athman (loc. cit) and higher than the findings of Garcia et al. (2007). The average litter size at birth was found to be 6.10 which compared favourably with the finding of Machaty et al. (loc. cit). Kadirvel et al. (loc. cit) and Kantharaj and Athman (loc. cit).

Based on the percentage of sperm motility, live sperm and intact acrosome of semen preserved at 18°C for 96 hours, it could be concluded that BTS was superior to Kiev and LEY extenders for preservation of Hampshire boar semen, the fertility status of which was also satisfactory.

Summary
The comparative efficacy of three extenders was investigated for preservability of Hampshire boar semen at 18°C for 96 hours. The overall mean sperm motility, live sperm and intact acrosome was 72.67 ± 0.88, 78.89 ± 0.70 and 80.20 ± 0.86 per cent irrespective of preservation period in BTS extender which was significantly (P<0.05) higher than Kiev and LEY extenders. The overall mean percentage of sperm motility, live sperm and intact acrosome decreased significantly (P<0.05) with the increase in hour of preservation irrespective of extender. The rate of farrowing and average litter size at birth was 71.43 per cent and 6.10 respectively when A.I. was carried out with semen preserved in BTS extender. It was concluded that BTS was superior to Kiev and LEY extenders for preservation of Hampshire boar semen.

References