QUANTITATIVE EVALUATION OF GOAT SEMEN FROM FRESH, CHILLED AND FROZEN SAMPLES

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Artificial insemination (AI) is an important tool for genetic improvement in livestock. The success rate of AI is influenced by many factors, including the semen quality used for inseminating the female (1). Fresh semen is processed and stored in liquid nitrogen before being distributed to the farmers. The use of liquid nitrogen was to freeze the semen for long-term storage. Environmental factors such as elevated temperature and human errors can affect the semen quality during semen processing. Therefore, the semen processing handling is critical to maintain the sperm quality. Semen quality evaluation during processing is crucial to make sure the semen is in good condition before stored and distributed. To ensure even minimal success, proper diluent, sperm dilution rate, cooling rate and thawing rate are essentials to maximize the post-thaw recovery of sperm and consequently fertility (2).

In Malaysia, National Institute of Veterinary Biodiversity (NIVB) at Jerantut, Pahang is responsible for producing frozen livestock semen to be distributed to the department’s AI personnel for AI extension services to the farmers since 1989. During this period, NIVB has continuously optimizing the method for semen processing and storage. Some studies have been done including the effect of cryostorage duration on sperm structure deformity (3) and the effect of different extender on semen quality (4). The objective of this study is to evaluate the goat semen quality using standard procedures set by the NIVB for goat semen. Semen studied are from fresh, chilled and frozen samples.

Twenty three (23) bucks are used as a sample study with the total ejaculation of 296. Semen was collected using artificial vagina and immediately transferred to a 37°C water bath. Samples from fresh, chilled and post-thawed semen were taken and analyzed with Computer Aided Semen Analyzer (CASA) software (CEROS, IMV Technologies). The semen was diluted without washing with commercial extender (Bioexcell, IMV Technologies). The result of the semen evaluation for semen quantitative quality was then analyzed using Statistical Package for Social Science (Ver. 17.0). The parameters for the semen quantitative quality are Rapidly Progressive Motile Spermatozoa (RPMS) (%), Curvilinear Velocity (VCL) (µm/s), Average Path Velocity (APV) (µm/s), Amplitude of Lateral Head Displacement (LHD) (µm/s), Beat Cross Frequency (BCF) (Hz) and Straightness (STR) (%). The result of the parameters are shown in Table 1.

<table>
<thead>
<tr>
<th>Group of Samples</th>
<th>RPMS (%)</th>
<th>VCL (µm/s)</th>
<th>APV (µm/s)</th>
<th>LHD (µm/s)</th>
<th>BCF (Hz)</th>
<th>STR (%)</th>
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<tbody>
<tr>
<td>Fresh</td>
<td>72.872 ± 7.9464a</td>
<td>130.548 ± 3.6689ab</td>
<td>110.269 ± 0.9938a</td>
<td>6.685 ± 0.0662a</td>
<td>14.579 ± 0.3753a</td>
<td>86.854 ± 0.2032a</td>
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<tr>
<td>Chilled</td>
<td>64.153 ± 0.7828a</td>
<td>118.887 ± 1.1672b</td>
<td>103.689 ± 1.0539a</td>
<td>6.259 ± 0.0909bc</td>
<td>15.827 ± 0.4737ab</td>
<td>87.387 ± 0.3053b</td>
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<tr>
<td>Frozen</td>
<td>52.032 ± 0.7024a</td>
<td>110.052 ± 1.6797ac</td>
<td>104.776 ± 4.8810b</td>
<td>5.834 ± 3.262c</td>
<td>22.470 ± 0.6024b</td>
<td>91.416 ± 0.2808c</td>
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</table>

Table 1. Mean with standard error of semen quantitative quality from three groups.
The mean sperm concentration for this study is $845.97 \times 10^6 \pm 35.46680 \times 10^6$ spermatozoa/ml. In general, most sperm quality parameter assessed in fresh semen were higher than those evaluated in chilled and frozen which were in line with other studies (5,6) except for Beat Cross Frequency and Straightness. These decreasing patterns of qualities were indicators of sperm deformity and damages and caused by several technical and physiological circumstances. Although the sperm were decreased in quality starting from chilled state, but it is still can be accepted for artificial insemination application. The spermatozoa stored in chilled state for 5-8h from other study (1) were satisfactory in progressive motility, while longer storage reduced the quality. In the present study, the semen samples were chilled for not more than 4 hours. On the other hand, the results of post-thawed frozen semen were not significantly different for progressive motility although only half of the population of motile spermatozoa survived the freeze-thaw process (1,7). This is because the semen pre-processing for storage will cause ultrastructural, biochemical and functional damage resulting in a reduction of motility, viability, impaired transport and eventually fertility (6). It is suggested that the ejaculation with high quality of initial fresh semen and low percentage of morphological abnormalities is important and has the best average value of post-thaw motility and velocity together with other parameters after freezing (6).

As a conclusion, the results revealed that sperm qualities decrease following cryopreservation. However the average values obtained from the present studies fall within the acceptable and successful rate for artificial insemination (5).

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