techline

ABS Global Technical Services Newsletter

Limitations of Field Evaluation for Semen Quality

This is a condensed version of the Guidance prepared by the NAAB Technical Committee [Proc.21st Technical Conf. Artif. Insem. and Reprod., NAAB, 2006, pp. 82-84] (Adapted by Jeff Betthauser, ABS Global, Inc. Research Associate and Dr. Joe Dalton, University of Idaho Extension Dairy Specialist and ABS Global Technical Services Team)

From feeding the bulls to packaging the semen, A.I. organizations go through several quality control steps to ensure the best product for their customers. After processed semen leaves the AI production center, semen quality in the field may be maintained by adherence to accepted procedures designed to safeguard semen quality. Nevertheless, additional semen quality evaluations are occasionally warranted to address field questions from producers, veterinarians or consultants. These evaluations should be completed by the A.I. Center laboratory or under controlled and experienced laboratory operators in the field.

If a field evaluation is chosen, evaluators should consider the following points as a minimum before performing semen quality evaluations:

- Environment
- Microscope
- Sperm Counting
- Skill Set of Tester

Environment

Though most people wouldn't expect the room temperature in a lab or office to affect semen evaluation results, it turns out that when evaluating semen the room temperature should be between 70-75° F. In addition, microscope slides and cover slips should be warm (90-95° F) to avoid cold shock of the semen. Slide warmers and heat-regulated stages on all microscopes are also necessary to ensure a constant temperature during the entire evaluation, thereby reducing variability.

The thickness of the semen smear must be controlled to provide adequate visibility of individual sperm. This may be accomplished through extensive training or through the use of precise sample volumes. To provide the best opportunity for reducing unintended variability and arriving at a correct interpretation, skilled evaluators must also control the time between smear preparation and evaluation, number of fields evaluated and time spent studying each field.

Divergence from optimal environmental conditions while performing field evaluations will result in abnormal spermatozoal swimming patterns, reduced motility, rapidly declining sperm viability and inaccurate sperm number estimates.

Microscopes

Even under the best conditions, skilled technicians cannot adequately resolve individual sperm nor do a good job of semen evaluation with a Bright Field microscope. Consequently, a Phase Contrast microscope is recommended for semen evaluation. The Phase Contrast microscope is designed to view individual cells, such as sperm, allowing users to estimate motility and morphology. Even with a Phase Contrast microscope, special procedures are required to view individual sperm when semen has been processed in the different extenders. Hence, making it even more important to send the questioned semen back to the A.I. Center in which it was processed, as they have the correct equipment and experience in semen evaluation using their own extender.

Evaluating sperm morphology under a Phase Contrast microscope.

Sperm Counting

Accurate estimates of progressively motile sperm number per straw are not possible without highly trained personnel, a Phase Contrast or Differential Interference Contrast microscope, and a specialized counting chamber called a hemacytometer. Furthermore, research has shown that multiple straws and multiple samples from each straw are necessary to accurately estimate the sperm number per straw, as using semen from only one straw often leads to inaccurate results.

Skill Set of Tester

Evaluating sperm is a difficult job. If personnel are not sufficiently trained in semen handling, microscopy, motility estimation, cell counting and sperm morphology, it is probable that inaccurate estimates will be obtained.

Summary

Given the importance of accurate semen evaluation and the possibility of introducing variability in semen quality estimates from environmental and human sources in the field, it is recommended that when semen quality is questioned, several straws should be returned to the A.I. Center that processed the semen for an evaluation. If this is not possible, then field evaluation of semen in accordance with the above points is acceptable.

Additional Reference

Proc. 11th Tech Conf. A.I. Reprod. (NAAB),1986, pp 102-104.

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