



Bull Fertility Testing: Is that Test Valid & Reliable

We are all aware that cow-calf reproductive efficiency is the most important economic trait of our cow herd. As cattlemen reproductive performance is important for all of us and we are all concerned about the economic viability of our industry. Bull breeding soundness examinations (BBSE) are one of the important tools needed to achieve economic success. When BBSEs are used correctly they become an invaluable tool to improve the reproductive performance and genetic pool of our cattle herds. On the other hand, we could just be holding “a happy piece of paper” that only makes us feel secure while we are continuing to use subfertile bulls. It is usually the things we don’t know that hurts us. How can you tell if that paper is worth the ink used to write it?

The value of a BBSE can be broken down into two general areas: validity and reliability. The validity of any test asks the question; does the test results give a true representation of the actual state we are attempting to measure. I have seen BBSEs performed where sperm morphology is not even performed. Obviously where more bulls fail due to low morphology than any other single parameter that test would not be valid.

The next question; is the test reliable? In other words, if I have a valid test and it represents what we intended to measure do these measurements reflect our intended goal of a bull that will produce high conception rates. An example is a bull with a genetic predisposition to become very stressed. We know that stress will negatively effect sperm morphology and how stress effect different bulls to varying degrees. A valid BBSE is performed, however, due to this genetic predisposition and after the bull goes through a sale barn and is introduced to a new environment his fertility plummets. In this case the original test would no longer be considered reliable, it no longer reflects the true fertility of the bull.

What to look for to determine the level of validity of a BBSE

1. Expertise of the evaluator: A valid BBSE is highly dependent on the level of education and training of the evaluator. Many studies have shown a significant variation in BBSE results base on the differences of the evaluator. BBSE should be performed by a veterinarian and one who has had additional training specific for BBSEs.
2. Environment: The microscope, slide warmers, slides, media and other equipment must be kept out of the wind and dust. This equipment needs to be in an environment that is at least 55^o F. To properly assess the scrotum and perform a measurement the temperature must be warm enough for the testicles to hang naturally and not be drawn up. Like any reputable lab, the environment must be controlled to expect constant valid results.
3. Procedure or process: Motility assessment is performed using warmed slides, pipets, media, and a stage warmer. Dilution media using phosphate buffered saline and is uses a consistent technique for the ability to observe individual progressive motility and to observe at least 100 sperm. Morphology assessment to create a complete differential spermiogram using 1000X magnification and taking enough time that small abnormalities such as mitochondrial sheath defects and small apical vacuoles will not be missed. A quality ejaculate with a concentration of at least 100 sperm under 200X.
4. Type of microscope and slide preparation method: A wet mount using differential interface contrast (DIC) has been shown to be the most accurate, second a wet mount using phase

contrast, and third stained slides and a light microscope. A non-stained slide using a regular light microscope should never be used.

5. Physical examination: A complete assessment of the bull including a rectal exam, scrotum assessment, sheath and penis assessment, feet & legs, eyes & mouth, and body condition.

What to look for to determine reliability

1. Bull libido and breeding ability: Many bulls may be classified as satisfactory but lack the desire or ability to breed. It is vital to observe every bull to ensure they can and will breed.
2. Timing: The closer a BBSE is performed to the actual time of breeding the more reliable the test. Many factors will affect fertility including season of the year, age, environmental stressors and temperatures, toxins, nutrition, disease, trauma, and many that may be unknown or unseen. Any evaluations performed greater than a month prior to breeding should be questioned and even during the period of a month it is possible for changes to have occurred.
3. Proper classification of potential breeding: It is customary to use a 30% progressive motility and 70% normal morphology as our minimums for satisfactory classification. Most of the time these numbers will serve us well, however studies have identified proximal cytoplasmic droplets, nuclear vacuoles, and pyriform heads to decrease fertility at levels of 20%. While detached heads may not adversely affect fertility until greater than 30% to 40% are seen. The use of a complete differential spermogram can better help to create a reliable classification.
4. Unknown factors: A BBSE can not determine every aspect that will affect bull fertility. Science continues to research and has identified other parameters that can be tested. A BBSE is a viable screening test. If concerns about the fertility of a bull are noticed, a valid BBSE evaluation is satisfactory, and the bull's ability to breed has been shown, then additional testing may be needed. A specialized andrology lab will have more information to assist.