Semen Collection by Electronics

By Harold J. Hill, DVM - Veterinary Consultant

The Principle of so-called Electro-ejaculation is based on stimulation of the sympathetic-parasympathetic nervous systems. The posterior mesenteric and pelvic plexuses control, to a large degree, the following physiological functions: (A) smooth muscles of the head of the epididymis, vas deferens, ampulla of the vas deferens, ejaculatory duct system, accessory glands and that part of the urethra from the ejaculatory duct area to the external opening; (B) smooth muscles of the vascular system of the accessory gland area and the shaft of the penis; (C) diversion of the blood supply to the cavernous areas of the erectile tissue within the penis; (D) a concurrent relaxation of the retractor penis muscles; (E) erection of the muscle structures of the preputial sheath to accommodate movement to the shaft of the penis within and; (F) the instantaneous mixture of accessory gland fluids with spermatozoa and forcible ejection of this mixture. In conjunction with these segments of the autonomic nervous system the spinal nerves and their ganglia control the skeletal muscles in the case of electro-stimulation designed to produce ejaculation the lumbar and sacral spinal nerves are involved since they are contained in close proximity to the area within the pelvic cavity which receives the probe.

The preliminary sexual stimuli bombarding the bull wandering about in the pasture effects a progressive, methodical reaction, with each phase of the phenomenon taking place in order. A bull, downwind from a cow in heat, can hardly prevent the penis from undergoing a preset chain reaction. First a relaxation of the retractor penis muscles, then gradual engorgement of the cavernous spaces in the body of the penis, followed by an uncoiling action of the sigmoid flexure, this causing beginning protrusion, or at least, a movement of the penis along the underside of the belly. Next, the accessory glands begin to function and as the wind gets stronger (or the two principles move closer together), the fluid drips from the penis and the white blanched color is erased by the red of blood rushing into the capillary structure of the periphery of the penis. Final erection and actual ejaculation is dependent upon contact stimulation brought about when the glans penis seeks out and touches the warmth of the female genital tract. The rest is involuntary - and sudden.

The objective of the process of artificial ejaculation is to stimulate the normal physiological reaction as nearly as possible. One very important factor in anything having to do with sex is “Time”! Whether it is a bull or a boar or a giraffe, the animal cannot react immediately. Consider these phenomena when attempting to bring about a comparable reaction with a rather crude facsimile of a cow in heat, grazing peacefully upwind from a domesticated animal incapable of understanding the psychological processes demanded of him by man!

SEMEN COLLECTION AND HANDLING

The collector should be available during all stimulation, since ejaculation may occur at any time after application of power. Do not be too anxious to collect the fluids being emitted from the urethra. The first fluids are usually contaminated with urine, or are of such chemical nature as to adversely influence the motility of the sample. Wait until the color changes toward opacity and is thickened and white.

Remember, temperature is one of the most critical factors when collecting semen. Every effort should be made to prevent the sperm cells touching a surface, which is more than 5° F below body temperature or 3°F above! And this means rubber collection cones, test tubes, glass microscopic slides, microscope stages, Live-Dead Stain or Sodium Citrate diluting fluid! Failure to control temperature will have severe adverse effects on sperm motility. Valid evaluation of semen quality cannot be made without careful examination for progressive motility of sperm: coupled with a study of sperm morphology, percentage of live cells and concentration.

Evaluation of these characteristics of semen plus a careful physical examination of the animal is the only way to properly prognose the breeding potential of the bull.

Precautions to be Observed

For accurate representation and interpretation of the end result of Live-Dead staining technique, rapidly adhere to the following:

1. Avoid any adverse chemical or physical condition that might initiate necrosis of the sperm cells between the moment of ejaculation and the mixing of the stain and semen sample. This includes all surfaces contacted by the sperm during the collection process.
2. Keep temperature of the semen sample, the microscope slides, the stain and the working area within which the sample is to be mixed and smeared within a range of 3° to 5° F of a common temperature.
3. Arrest, as quickly as possible, the chemical reaction initiated when the Live-Dead strain and the semen sample contact. Accomplish this by heating the smeared slide immediately, to evaporate intercellular and intracellular moisture. A slide warmer will provide uniform, controlled heat and evenly distributed temperature that may range from 115° to 250°F.
4. Examine the smear and interpret the reaction before destruction of the life functions of the cells that were alive at the time of contact with the stain. This examination should be performed within 2 hours.