# ASSESSMENT OF AI AND EMBRYO TRANSFER TECHNIQUE USING TRANSRECTAL ULTRASONOGRAPHY

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## Introduction

The success and widespread use of artificial insemination and direct embryo transfer in cattle requires that field technicians and veterinarians consistently and accurately deposit semen or embryos into specific locations within the female reproductive tract. In cattle, deposition of extended semen into the uterine body or uterine horns using the rectovaginal technique results in higher conception rates compared with intracervical deposition (4). Because artificial insemination using sexed semen must be conducted using low numbers of sperm, sexed semen are deposited into the uterine horns rather than the uterine body or cervix (2). When conducting direct transfer of embryos, the local relationship between the corpus luteum, uterine horn, and embryo during maternal recognition of pregnancy in cattle (3) requires that single embryos be transferred into the uterine horn ipsilateral to the corpus luteum (10). Direct transfer of single embryos into the uterine horn contralateral to the corpus luteum results in a 43-55% reduction in pregnancy rate compared to contralateral transfers (9).

Several methods have been used to assess insemination technique in cattle. These include infusion of colored or radioactive dyes into excised bovine reproductive tracts and subsequent evaluation using visual observation or radiography (6,7). Nonreturn rates of professional inseminators were improved by assessment and retraining using the radiographic technique (7), supporting the benefit of periodic assessment of technicians. A technique using B-Mode, linear array ultrasonography to assess the simulated site of semen placement was originally developed and described in detail previously (1). This technique is advantageous because it replicates the experience during insemination in live cattle compared with those techniques using excised bovine reproductive tracts. This technique, therefore, is a useful tool for training, evaluating, and retraining technicians who routinely conduct artificial insemination or direct embryo transfer in cattle.

## Materials and Methods

Assessment of the site of semen or embryo deposition during nonsurgical artificial insemination or embryo transfer was conducted using a procedure described previously (1) with minor modifications. A French-style artificial insemination rod plastic sheath (Nasco, Fort Atkinson, WI) designed for insemination rods utilizing 0.5 ml French semen straws was modified to hold a 4-mm by 5-mm ellipsoid brass bead. The brass bead was purchased as part of a fishing tackle swivel apparatus from a local sports supply store. Separation of the brass bead from the swivel apparatus exposed the hollow core of the brass bead through which the end of a 50 cm length of nylon fishing line (6 lb. test monofilament) was threaded and secured with a square knot. The tapered portion of the end of the plastic insemination rod sheath was removed with a scissors, and the brass bead was forced

into the cut end of the plastic sheath so that the nylon line remained free. The plastic sheath holding the brass bead and nylon line was then fitted over the insemination rod and secured with a plastic O-ring.

After assembling the insemination apparatus, the plunger of the insemination rod was depressed until the bead was forced from the plastic sheath. This procedure was repeated until the plastic sheath was stretched sufficiently to hold the brass bead firmly while requiring minimal force to expel the bead from the sheath. Dry Holstein dairy cows at various stages of the estrous cycle were used to demonstrate this technique. Using standard rectovaginal technique, the assembled insemination rod with the modified plastic sheath, brass bead, and nylon line were passed through the vagina and cervix and into the uterine body or uterine horns. The brass bead was placed into various portions of the female reproductive tract by depressing the plunger of the insemination rod. After expelling the bead from the sheath, the insemination rod was carefully removed so that the position of the brass bead was not disturbed.

The position of the brass bead in the reproductive tract was determined by using an ultrasound machine equipped with a transrectal 7.5 MHz linear-array transducer (Aloka 500V; Corometrics Medical Systems, Inc., Wallingford, CT). The reproductive tract was scanned as described previously (8) to locate the brass bead. The brass bead appeared on the ultrasound monitor as a bright white spot. A white arc appeared directly above the bead, and an echogenic shadow extended from the location of the bead toward the bottom of the ultrasound monitor. The brightness of the spot results from the complete reflection of ultrasonic sound waves by the brass bead compared with the specular and nonspecular echoes of the surrounding soft tissues of the reproductive tract (5). The arc above the spot and the trailing shadow are reverberation artifacts (5).

An experienced ultrasound operator can easily distinguish the position of the bead in relation to various locations within the reproductive tract including the greater curvature of the left or right uterine horn, the internal bifurcation of the uterus, and the cervix. After the ultrasound procedure, the bead is removed from the reproductive tract by pulling the external portion of the nylon line tied to the brass bead. The brass bead and nylon line can then be cleaned, disinfected, and reused for subsequent evaluations.

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