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Welfare aspects of theriogenology: Investigating alternatives to electroejaculation of bulls

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Abstract

Evaluation of the breeding soundness of bulls is an important management tool. Electroejaculation has been a reliable method of obtaining a semen sample for the purpose of evaluating breeding soundness, but is considered by some to be inhumane on the grounds that it is painful. This paper provides a review of studies conducted to find ways to both measure, as well as lessen, pain associated with electroejaculation, and to explore alternatives to electroejaculation in bulls.

Changes in heart rate, serum cortisol, serum progesterone, relative aversion, and degrees of vocalization, struggling and lying down have been used to assess the pain associated with electroejaculation. Transrectal massage and artificial vaginas, and oxytocin and cloprostenol have been investigated as alternatives to, and facilitators of electroejaculation, respectively. Epidural, intravenous and topical anesthetics have been used to ameliorate the pain associated with electroejaculation.

Serum progesterone and degrees of vocalization are useful for measuring the pain associated with electroejaculation in bulls. Transrectal massage and artificial vaginas are not as efficacious as electroejaculation for obtaining a semen sample and drugs used to facilitate or decrease pain associated with electroejaculation have not been efficacious enough to warrant use. Transrectal massage of the ampullae may be of some use as an alternative to electroejaculation in docile bulls and may be also be used to decrease the duration of subsequent electroejaculation.

Pain associated with electroejaculation may be influenced by operator technique; therefore, operators of electroejaculator equipment must strive to apply electrical stimulation as gently as possible.

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1. Introduction

Cattle producers should consider bull fertility to be of the utmost importance and should submit all breeding bulls for an annual breeding soundness evaluation (BSE). To pass a BSE; bulls must have satisfactory semen quality, be physically sound and must be able to complete service. Obtaining a semen sample must be an integral part of every BSE and every effort should be made to obtain semen samples of the highest quality possible. Failure to do so, may lead to erroneous conclusions concerning the bull's breeding potential.

There are essentially four ways to collect semen from a bull: aspirate from the vagina of a recently bred cow; utilize an artificial vagina (AV); transrectal massage (RM) of the accessory sex glands; and electroejaculation (EEJ). For the last half-century, EEJ has been a very effective method of collecting semen from range bulls. This technique does not require mount animals, is not physically demanding and is easily adaptable to most cattle handling facilities. In recent years, a variety of automated electroejaculators have been developed. These machines are particularly useful for those unaccustomed to the manual technique of applying electrical stimulation and tend to be very reliable in terms of their ability to induce semen emission. A distinct disadvantage of EEJ, however, is that it is considered to be painful to bulls [1]. Electroejaculation without anesthesia has been discouraged in the UK (Michael McGowan, Personal Communication, 2004) and banned in several European countries [1]. In North America, EEJ is still considered an acceptable procedure by most animal welfare committees, but is becoming increasingly controversial. For many years this controversy was fueled by a lack of critical evidence to define the reaction of bulls to EEJ. It has been stated that since EEJ without anesthesia is very painful to humans [2,3] it, therefore, must be painful to bulls [1]. The remainder of the paper is a review of recent research conducted to find ways to both measure and lessen pain associated with EEJ, and to explore alternatives to EEJ.

2. Electroejaculation

Electroejaculation of domestic animals was first reported in 1936 [4,5]. Most modern electroejaculators utilize a sine-wave pulse at a frequency of 20–30 cycles/s [6,7]. Other wave forms and frequencies have proven to be inferior, often requiring more electrical stimuli to achieve ejaculation [6]. Increased electrical intensity tends to cause unnecessary muscle contraction [5]. The maximum voltage of the Lane Pulsator IV (Lane Manufacturing, Denver, CO, USA), a relatively new and popular electroejaculator model, is 16 V, with a maximum current of <900 mA. With most bulls, ejaculation occurs with electrical impulses <8 or 9 V (Tom Chambers, Technician, Lane Manufacturing, personal communication, 2004).

Bulls should be suitably restrained for EEJ. Once transrectal examination of the bull's ampullae, seminal vesicles, prostate, pelvic urethra, and inguinal rings has been completed, there is usually a massage over these areas lasting from 10 to 60 s. The massage is intended to sexually excite the bull and cause relaxation of the anal sphincter prior to probe insertion. After the probe is in place, electrical stimulation is carefully applied while observing the response of the bull. Once there is an indication that the bull has felt the stimulation, such as

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