

Direct Comparison of Natural Service versus Timed Artificial Insemination: Reproductive Efficiency and Economics

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Introduction

Poor estrus detection contributes to low pregnancy rate (rate of pregnancy by day postpartum [pp]; PR) and economic losses on dairy farms. The use of natural service (NS) and timed artificial insemination (TAI) are two options that minimize problems with detection of estrus. The objective of this study was to compare reproductive performance and economics between TAI and NS breeding systems.

Materials and Methods

Lactating Holstein dairy cows (n = 1055) were randomized at 42 days (d) pp into two groups TAI (n = 543) and NS (n = 512). Cows in the TAI group were pre-synchronized with two injections of PGF2 α (25 mg; Estroplan®) given at 42 and 56 d pp. At 14 d after the second PGF2 α , cows were given an injection of GnRH (100 μ g; Fertagyl®) followed 7 d later by an injection of PGF2 α , and a second injection of GnRH 56 h after PGF2 α . TAI was performed 16 h after the second injection of GnRH. At 18 d after TAI, cows received a CIDR insert (Eazy-Breed®) followed by insert removal and GnRH administration 7 d later. Pregnancy status was evaluated by ultrasound (US) at 32 d after TAI. Pregnant cows were re-checked 28 d later. Open cows at 32 d after TAI received PGF2 α , followed with an injection of GnRH at 56 h after PGF2 α . TAI was performed 16 h after GnRH. Open cows were sequentially re-synchronized with the same protocol until 223 d pp. Cows in the NS group received PGF2 α at d 42 and 56 and were moved to a bull pen at 70 d pp. Forty-two days later pregnancy status was evaluated by US. This allowed a diagnosable gestation length in pregnant cows to vary from 28 to 42 d. The presence of an embryo with a heartbeat was the criterion for pregnancy between 28 to 34 d by US, and gestation length from 35 to 42 was determined by size of the amniotic vesicle. Open cows were re-evaluated for pregnancy status 28 d later by US to confirm pregnancy for cows bred between days 1 to 27 days prior to the 1st pregnancy check. Pregnant cows were re-confirmed 28 d later. The bull to cow ratio in the NS herds was one

bull per 20 open cows. Bulls were rested for 14 d after 14 d of cow exposure. The interval between services in the TAI group was 35 d due to the re-synchronization protocol employed and 21 days in NS assuming a 21 day estrous cycle length. For cows in the NS group, when pregnancy was diagnosed at 28 to 56 d then first and second services were classified at d 70 to 91 and d 92 to 113 pp, respectively. A cow in the NS group diagnosed 40 d pregnant at 150 d pp would have conceived at 110 d (i.e. 150 – 40) pp or at her second service. PR and conception risks (CR) at each service were analyzed with survival analysis and logistic regression. An economic analysis considering explicit and implicit costs between NS and TAI was performed.

Results

During the cool season (October 23, 2006 to April 21, 2007), first and second service CR for NS (36.98%, 29.85%, respectively) and for TAI (44.31%, 30.67%, respectively) did not differ. As expected, PR was lower during the warm season, but did not differ between NS and TAI (27.36%, 24.04%; 27.06, 29.56%; second and second service, respectively). Median times to conception up to 223 DIM estimated from 32 d after breeding for TAI cows and 28 to 56 d for cows bred by NS were 109 d (95 % CI=104 to 125) and 116 d (95 % C=15 to 117), respectively. Twenty-five percent of all pregnant cows conceived for NS at 84 DIM (95% CI = 83 to 86) and 81 days for TAI (95% CI = 80 to 82). The economic analysis considering explicit and implicit costs showed that the NS program cost \$40.68 per cow per year more.

Significance

In herds with low PR related to poor detection of estrus, uses of TAI or NS are viable options. Both of these breeding systems require strict attention to management compliance in order to optimize reproductive performance. Economic analysis within the content of this study showed that TAI is less expensive than NS and allows for immediate submission of all animals at the designated waiting period.