

Evaluation of reproductive performance of dairy heifers subjected to two estrus detection systems and treated with two prostaglandin formulations

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Introduction

Efficient and accurate identification of estrus is critical for the success of estrous detection based reproductive management. We hypothesized that management of dairy heifers with the aid of an automated estrous detection system (AES) would improve service rate and consequently the reproductive performance of dairy heifers. In addition we hypothesized that treatment of heifers with cloprostenol (CLO) would improve pregnancy per service compared with treatment with dinoprost (DIN). The objectives were to evaluate the reproductive performance of dairy heifers managed with the aid of an AES vs a mounting detector device (MD) and synchronized with CLO vs DIN.

Materials and Methods

Holstein heifers ($n = 1,019$) from a dairy herd in the Southeast of the USA were enrolled in the experiment at approximately 11 months of age when they were fitted with a Heat Rumination Long Distance collar (SCR Ltd., Netanya, Israel). At approximately 12 months of age heifers were randomly assigned to an estrous detection treatment (EDT: AES vs MD) and prostaglandin (PG) $F_{2\alpha}$ treatment (CLO vs DIN) according to estrous cycle day at $PGF_{2\alpha}$ treatment (d 4 to 6 vs d 7 to 26). Heifers in the AES treatment were serviced according to estrus detected by changes in activity and rumination, whereas heifers in the MD treatment were serviced when detected in estrus by farm personnel according to the activation of the KAMAR device (Steamboat Springs, CO). Heifers were treated with $PGF_{2\alpha}$ (same formulation throughout the experiment) every 14 d or until serviced. The experiment had a 2x2 design according to estrous detection treatment (AES vs MD) and $PGF_{2\alpha}$ treatment formulation (CLO vs DIN) and was analyzed as such, controlling for estrous cycle day at $PGF_{2\alpha}$ treatment. Binary variables were analyzed by logistic

regression using the LOGISTIC procedure. Hazard of service and pregnancy were analyzed by the Cox proportional hazard ratio using the PHREG procedure. Statistical significance was considered at $P < 0.05$ and tendency at $0.05 < P \leq 0.10$.

Results

Estrous detection treatment did not ($P = 0.17$) affect the hazard of service. There was a tendency ($P = 0.06$) for CLO heifers to have increased hazard of service (AHR = 1.14, 95% CI = 0.99-1.30) than DIN heifers. The interaction between EDT and $PGF_{2\alpha}$ treatment did not ($P = 0.65$) affect the hazard of service. Among heifers receiving artificial insemination for first service, EDT ($P = 0.78$), $PGF_{2\alpha}$ treatment ($P = 0.19$), and the interaction between EDT and $PGF_{2\alpha}$ treatment ($P = 0.81$) did not affect pregnancy at 75 d after first service. Among heifers receiving embryo transfer for first service, there was a tendency ($P = 0.06$) for AES treatment to increase pregnancy at 75 d after estrus compared with MD treatment (AOR = 1.52, 95% CI = 0.98-2.36), but $PGF_{2\alpha}$ treatment ($P = 0.71$) and the interaction between EDT and $PGF_{2\alpha}$ treatment ($P = 0.75$) did not affect pregnancy at 75 d after estrus. Hazard of pregnancy was not affected by EDT ($P = 0.25$), $PGF_{2\alpha}$ treatment ($P = 0.51$), and by the interaction between EDT and $PGF_{2\alpha}$ treatment ($P = 0.54$).

Significance

In a commercial dairy farm in the Southeast of the USA, reproductive management with an AES did not improve hazard of pregnancy, despite slightly increased pregnancy to embryo transfer. Despite a tendency for increased hazard of service, treatment with cloprostenol did not improve hazard of pregnancy of dairy heifers.