Discover Conference 2011

Economic and Reproductive Outcome of Programs Combining Timed Artificial Insemination and Estrus Detection Simulated with a Daily Markov-Chain Model

J.O. Giordano, A. Kalantari, and V.E. Cabrera. Department of Dairy Science, University of Wisconsin-Madison, Madison, WI.

Our objective was to compare the economic and reproductive performance of programs combining timed AI (TAI) and different levels of AI after estrus detection (ED) using a daily Markov-chain model. A dairy herd was represented with every cow following daily probabilistic events of aging, culling, mortality, pregnancy, abortion, and calving. The probability of pregnancy depended on the combination of insemination risk and conception risk (CR). All open cows had a probability of pregnancy between the end of the VWP and a cut-off for breeding at 250 DIM. After the cut-off, cows were labeled as "do not breed" until they were culled. An algorithm was iterated until the cows in each state remained unchanged (steady state). The value of a program was calculated as the sum of: milk income over feed cost (IOFC), culling and mortality cost, income from newborns, and AI costs. The model was used to compare the economic value of 19 programs. One program used 100% TAI (42% CR 1st TAI and 30% for 2nd and later service), whereas the other programs combined TAI with ED. The proportion of cows AI after ED for the combined programs ranged from 30 to 80% with levels of CR of 25, 30, and 35%. As the proportion of cows AI after ED increased, the CR of cows AI after TAI decreased. Overall, the program using 100% TAI and the program with 70 and 80% of cows AI after ED with CR of 35% had the greatest Net Present Value (NPV) and 21-Pregnancy rate (21d-PR; 21 and 18% respectively). In combined programs, as the proportion of cows AI after ED increased the NPV decreased, except when 70 to 80% of cows were AI after ED with 35% CR when the NPV was greater than that of the 100% TAI program. Increasing the proportion of culled cows due to extra heifers available in programs with good reproductive performance significantly increased IOFC, and calf value whereas it decreased cull, mortality, and AI cost. We conclude that the greatest economic benefits are obtained with 100% TAI and combined programs inseminating a significant proportion of cows after ED with good CR and increasing culling pressure when extra heifers are available.

Keywords economics reproduction dairy