ABSTRACT

It was reasoned that technologies that increase the reproductive rate of males and females in dairy cattle would realize higher responses to selection. The authors tested this hypothesis using deterministic simulation of breeding schemes that resembled those of dairy cattle in Kenya. The response to selection was estimated for four breeding schemes and strategies. Two breeding schemes were simulated, based on artificial insemination (AI) and multiple ovulation and embryo transfer (MOET) reproductive technologies. The strategies were defined according to the use of conventional semen (CS) and X-chromosome-sorted semen (XS). The four strategies therefore were AI with CS (AI-CS) and XS (AI-XS), and MOET with CS (MOET-CS) and XS (MOET-XS). The four strategies were simulated based on the current dairy cattle breeding goal in Kenya. A two-tier closed nucleus breeding programme was considered, with 5% of the cows in the nucleus and 95% in the commercial. Dissemination of superior genetic materials in the nucleus was based on all four breeding strategies, while in the commercial only the AI-CS strategy was considered. The strategies that increased the reproductive rates of both males and females (MOET-CS and MOET-XS) realized 2.1, 1.4, and 1.3 times more annual genetic gain, return and profitability per cow, per year, respectively, than strategies that increased the reproductive rates only of males (AI-CS and AI-XS). The use of CS or XS, however, did not affect response to selection in the two schemes. The findings demonstrate that reproductive technologies such as MOET maximize response to selection in dairy cattle breeding.

Keywords: artificial insemination, conventional semen, deterministic simulation, multiple ovulation and embryo transfer, X-chromosome-sorted semen