Comparative Study between Fixed-Time Artificial Insemination and Natural Mating on Reproductive Performance (conception and pregnancy rates) of Mpwapwa breed cows in Tanzania

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Abstract

The aim of this project was to assess whether using a PGF$_2\alpha$ synchronization protocol in Mwapwa cattle would improve reproductive performance. A standard 14-day PGF$_2\alpha$ synchronization protocol with a single FTAI was compared to NM over a 12-weeks breeding season. At the end of the study, 39/100 cows were pregnant in the FTAI group and 49/100 cows were pregnant in the NM group. This difference was not statistically significant (P=0.21), although the odds ratio of pregnancy was lower in the FTAI group than the NM group (unadjusted RR=0.8; 95% - CI 0.58-1.09). However, cattle in the PGF$_2\alpha$-treated group were only inseminated once, whereas the NM group could be naturally mated on multiple occasions during the breeding season; In addition, the use of PGF$_2\alpha$ allowed the use of AI, which is not feasible under most Tanzanian systems when cattle come into oestrus naturally. Thus, the results of this study suggest that PGF$_2\alpha$-based synchronization and FTAI, particularly if used alongside natural mating, can improve the reproductive performance of Mwapwa breed cattle as well as allowing for greater genetic gain than occurs with naturally mated cattle.

The proportion of cows that came into heat and displayed behavioural signs after administration of the first PGF$_2\alpha$ injection was very low (only 10/100 cattle). The reason for this poor response is unclear. It could be that oestrus detection was not very effective, or that a higher than expected proportion of cattle did not have a responsive CL. The most likely cause of the latter is a higher proportion of cattle in anoestrus. Further investigation of the reproductive state of Mwapwa cattle at the start of the breeding season would identify how important anoestrus is as a cause of poor reproductive performance. If anoestrus is common, identifying cattle in anoestrus at the start of the season could be useful, as they could be treated using progesterone-based programmes and cattle with a CL could be treated with PGF$_2\alpha$.

**Key words:** Mwapwa breed cattle, PGF$_2\alpha$ synchronization protocol, FTAI, NM, Reproductive performance.
Declaration

All rights and copyright of this thesis are reserved to the author. Permission is denied to access a copy of this thesis for illegal uses except for academic and research purposes. Author’s permission is considered to be an important pre-requisite for any production and publication of this thesis elsewhere.
Dedication

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List of abbreviations

AI  Artificial Insemination

AART Assisted Animals’ Reproductive Technologies

BCS Body Condition Score

BSE Breeding Soundness Evaluation/Examination

CI Confidence Interval

CL Corpus Luteum

CIDR Controlled Internal Drug Release (Intravaginal progesterone insert)

ET Embryo Transfer

FTAI Fixed-Time Artificial Insemination

FSH Follicle Stimulating Hormone

GnRH Gonadotrophin Releasing Hormone

LH Luteinizing Hormone

LU Livestock Unit

MOET Multiple Ovulation and Embryo Transfer

NM Natural Mating

PD Pregnancy Diagnosis

PGF2α (PGF/PG/ F2α) Prostaglandin hormone

RR Relative Risk

SC Scrotal Circumference