



Oestrus synchronisation in Red Sokoto does treated with prostaglandin F_{2α} and progesterone pessaries

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Abstract

Comparative oestrus synchronisation was carried out in 52 Red Sokoto does with the aim of evaluating the effectiveness and tightness of synchrony of prostaglandin F_{2α} (PGF_{2α}) and progesterone pessaries for clinical application. Does were randomly divided into PGF_{2α} treated (n = 18), progesterone pessaries treated (n = 18) and control (n = 16) groups. A double injection protocol of PGF_{2α}, 12-days apart, and progesterone pessaries inserted for 12-days were used to synchronise oestrus, with no treatment to the Control group. Six sexually active bucks were used as heat detectors. Intensive and non-intensive oestrus detections were employed using visual observation and apronisation. Standing to be mounted was used as the main sign of oestrus. Oestrus response rate was 88.9 %, 33.3 % and 37.5 % for PGF_{2α}, progesterone pessaries and Control groups respectively. Tightness of oestrus synchrony for PGF_{2α} was within four days, while that of progesterone pessaries was within three days. Progesterone pessaries retention rate was 94.4 %. It was concluded that PGF_{2α} double injection, 12-days apart, synchronised oestrus in Red Sokoto doe was more effective with a tighter synchrony and recommended for clinical use than progesterone pessaries inserted for 12-days.

Keywords: Oestrus, Progesterone, Prostaglandin F_{2α}, Red Sokoto doe, Synchronisation

Introduction

Oestrus synchronisation is globally accepted as an effective method of improving reproductive efficiency in livestock for faster genetic improvement, multiplication, and demarcation of breeding season (Voh Jr. *et al.*, 2003). Clinical application of this reproductive tool for productivity in the field by clinicians and other researchers has not been favoured especially in the developing countries. Oestrus synchronisation in Caprines and Ovines is achieved by control of the luteal phase of

the oestrous cycle, either by providing exogenous progesterone or by inducing premature luteolysis (Wildevus, 2000) using PGF_{2α} (Voh Jr., 1996). Oestrus response to synchronisation agents is reportedly affected by season, age, breed, stage of oestrus cycle, nutrition and dosage of synchronizing agent (Alemede & Fasanya, 1999; Wildevus, 2000). This study was therefore undertaken with the objective of evaluating the effectiveness and tightness of synchrony of PGF_{2α} and progesterone pessaries (P₄P)

for clinical field application for improving reproductive efficiency.

Materials and Methods

Study area and experimental animals

The study was carried out at a facility of the National Animal Production Research Institute (NAPRI), Shika, Ahmadu Bello University, Zaria. A total of 58 Red Sokoto goats (52 does, 6 bucks) were used for the study. Pre-experimental observation period of three months to establish cyclicity was performed before selection of the animals for experiment. Ballottement, body condition score (BCS) assessment (Pullan, 1978), aging via the records and evaluation of the dentition (Clair, 1975), parity, reproductive performance and physical parameters were used to select 52 RSG does and 6 bucks for the study. The does comprised of 30 adult and 22 maiden does with an average body weight of 21.0 kg, BCS of 3.0 (scale of 1 – 5) and age 18 months. Six matured and sexually active bucks were apronised and used for heat detection. The bucks had an average body weight of 21.0 kg, BCS of 3.0 and 24 months in age.

Groups and feeding

The does were randomly assigned to three groups: PGF_{2α}, P₄P and control groups. Each of the groups contained two apronised bucks as heat detectors. Animals were fed feed containing metabolizable energy (ME) of 11.7mJ/kg dry matter (DM) and 15% crude protein (CP) formulated for maintenance and reproduction. The feed was compounded using maize (*Zea mays*), maize offal, wheat offal and cotton seed cake, and 50:50 ratio of grass (hay – *Digitaria smutsi*) to concentrate was used. Salt was added at 2 %. Concentrate was fed in the morning (8:00 – 10:00 am) and evening (4:00 – 6:00 pm) while hay and water were provided *adlibitum*.

Oestrus synchronization and detection

Comparative oestrus synchronisation of does was carried out with PGF_{2α} and progesterone pessaries (P₄P). For the PGF_{2α} group, animals were treated with 12.5mg of PGF_{2α} [Dinoprost tromethamine – Lutalyse®, Pfizer, NY, USA]. Protocol was the double injection of PGF_{2α}, 12-days apart. In P₄P group, treatment was with progesterone pessaries containing 30mg Cronolone (Florogestone Acetate, Chronogest®, Intervet Company, France). Pessaries were inserted into the vagina using an applicator following lubrication. After insertion, the were kept

in place for 12 days before removal. No treatment was administered to the Control group.

Apronised bucks and visual observation were employed for oestrus detection. Matured sexually active apronised bucks were introduced from the day of commencement of the experiment and maintained throughout. Two bucks served each of the three groups. Visual heat detection was intensive and non-intensive. The intensive detection was carried out continuously for 168 hours by experienced heat detectors taking shifts after each PGF_{2α} injection and P₄P withdrawal. The non-intensive was for 28 hours (four hours daily: 8:00 - 10:00 am and 4:00 – 6:00 pm) whenever the intensive ended.

Statistical analysis

Oestrus response, oestrus tightness and P₄P retention data were collected. The data collected was analysed using Pearson Chi-Square tests.

Results and Discussion

Progesterone pessaries retention rate was 94.4 % and non-retention rate was 5.6 % for P₄P treatment group (Table 1). Muco-purulent and sometimes pungent smelling vaginal discharge was observed in five (27.8 %) does at the time of P₄P removal during the course of study.

Progesterone pessaries retention rate (94.4%) was within the reported ranges in the same breed (Omontese *et al.*, 2013). Factors such as pessaries texture and consistency, length of vaginal tract and method or technique adopted for inserting the pessaries may be responsible for influencing pessaries retention (Omontese *et al.*, 2013). The discharges had minimal effect on synchronization. The pessaries remained intravaginal in almost all the does to provide exogenous source of progesterone concentration to prevent ovulation until withdrawal thereby synchronising oestrus. Furthermore, the study indicates the does that lost pessaries were able to exhibit fertile oestrus. Hence these observations have positive clinical relevance on field work when pessaries are employed.

Oestrus response rate was 88.9 %, 33.3 % and 37.5 % for PGF_{2α}, P₄P and Control groups respectively. The oestrus response rate for PGF_{2α} treatment was higher than those of the P₄P and Control groups; there was significant ($P < 0.05$) difference. Spontaneous oestrus response of the Control group was higher than that of P₄P but less than the PGF_{2α} groups (Table 1). First and second PGF_{2α} treatment oestrus response rates were 77.8 % and 88.9 %

respectively. There was significant ($P < 0.05$) difference (Table 2). Prostaglandin F_2 -alpha ($PGF_{2\alpha}$) and progesterone pessaries (P_4P) used induced and synchronized oestrus, however, $PGF_{2\alpha}$ double injection protocol was more effective and had higher values with significant ($P < 0.05$) difference for both first (77.8%) and second (88.9%) injections than P_4P (33.3%) and control (37.5%). The oestrus response findings of $PGF_{2\alpha}$ being reported was in agreement with the reports of earlier authors that worked on the breed (Bello, 2011; Omontese *et al.*, 2013; Omontese *et al.*, 2014), other local breeds (Akusu, 2003) and those elsewhere (Medan *et al.*, 2002, Whitley & Jackson, 2004). The 77.8% and 88.9% for the double injection protocol obtained were within reported ranges (Alemede & Fasanya, 1999; Jatau, 2002). The practical application is that single injection may be used to synchronise does especially where scarcity of agent or financial constraints is the case. However, to obtain higher oestrus response rate, double injection should be given preference as indicated by results. Similarly, oestrus response rate for P_4P indicated induction of oestrus, and agreed with previous report in this breed (Omontese *et al.*, 2013) and in other breeds (Whitley & Jackson, 2004). Differences in oestrus response among breeds has been attributed to several factors such as the effect of breed, parity, age, co-treatment (gonadotrophins), treatment protocol, season,

nutrition, climate, location and drug brand (Evans *et al.*, 2004; Omontese *et al.*, 2013). Results indicated that the RSG does utilized and responded to the exogenous source of progesterone concentration contained in the pessaries to prevent ovulation until pessaries withdrawal, thereby synchronising oestrus. Prostaglandin F_2 -alpha treatment group had tightness of oestrus synchrony within four days, P_4P had three days and control within four days (Table 2). Tightness or compactness of synchrony for $PGF_{2\alpha}$ was typical and better than P_4P and agrees with the reports of Bello (2011) in the RSG and Akusu (2003) in WAD goat. The oestrus response of 77.8% and 88.9% occurred between days two and five with peak on day three and four. The results shows that emphasis should be laid on days two to five for oestrus detection when $PGF_{2\alpha}$ is used for oestrus synchronisation in RSG and this is the focus and novelty of this work. Similar tightness was also observed with the P_4P and agrees with earlier reports in RSG (Bello, 2011; Omontese *et al.*, 2012; Omontese *et al.*, 2013). For practical application, emphasis should be laid on days one to three for oestrus detection when P_4P is used for oestrus synchronisation in RSG. It was concluded that $PGF_{2\alpha}$ double injection, 12-days apart and Progesterone pessaries (P_4P) inserted for 12-days both synchronised oestrus in Red Sokoto does, with $PGF_{2\alpha}$

Table 1: Oestrus response and progesterone pessaries retention rate following treatment with Prostaglandin F_2 -alpha and Progesterone pessaries in Red Sokoto does

Treatment	Pessaries retention		Oestrus response
	Lost	Retained	
Prostaglandin F_2 -alpha; n = 18	-	-	16 (88.9 %) ^a
Progesterone pessaries; n = 18	1 (5.6 %)	17 (94.4 %)	6 (33.3 %) ^b
Control; n = 16	-	-	6 (37.5 %) ^c
Total (n = 52)	1 (5.6 %)	17 (94.4 %)	28 (53.9 %)

n = number; ^{a, b and c} indicate significant ($P < 0.05$) difference

Table 2: Oestrus response and tightness following synchronisation with Prostaglandin F_2 - alpha and Progesterone pessaries in Red Sokoto doe

Days	*Prostaglandin F_2 - alpha	Progesterone pessaries	Control
1	0 (0.0 %)	3 (16.7 %)	0 (0.0 %)
2	3 (18.8 %)	0 (0.0 %)	1 (6.3 %)
3	5 (31.6 %)	2 (11.1 %)	0 (0.0 %)
4	5 (31.3 %)	0 (0.0 %)	0 (0.0 %)
5	3 (18.8 %)	0 (0.0 %)	2 (12.5 %)
6	0 (0.0 %)	0 (0.0 %)	2 (12.5 %)
7	0 (0.0 %)	1 (5.6 %)	1 (6.3 %)
Total	16 (88.9 %)	6 (33.3 %)	6 (37.5 %)

*First injection oestrus response rate was 77.8 % and tightness was between days 2 - 5

being more effective, having higher oestrus response rate and tighter synchrony than P₄P.

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Conflicts of Interest

The authors declare they have no conflict of interest.

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