SHORT COMMUNICATION

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Oestrus synchronisation in Red Sokoto does treated with prostaglandin F₂α 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 F₂α (PGF₂α) and progesterone pessaries for clinical application. Does were randomly divided into PGF₂α treated (n = 18), progesterone pessaries treated (n = 18) and control (n = 16) groups. A double injection protocol of PGF₂α, 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 apronisat. Standing to be mounted was used as the main sign of oestrus. Oestrus response rate was 88.9 %, 33.3 % and 37.5 % for PGF₂α, progesterone pessaries and Control groups respectively. Tightness of oestrus synchrony for PGF₂α was within four days, while that of progesterone pessaries was within three days. Progesterone pessaries retention rate was 94.4 %. It was concluded that PGF₂α 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 F₂α, 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 (Wildeus, 2000) using PGF₂α (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; Wildeus, 2000). This study was therefore undertaken with the objective of evaluating the effectiveness and tightness of synchrony of PGF₂α 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$_{2α}$, P$_4$P 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 smutis) 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 ad libitum.

Oestrus synchronisation and detection
Comparative oestrus synchronisation of does was carried out with PGF$_{2α}$ and progesterone pessaries (P$_4$P). 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 P$_4$P group, treatment was with progesterone pessaries containing 30mg Cronolone (Florestone 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 P$_4$P 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 P$_4$P retention data were collected. The data collected was analysed using Pearson Chi-Square tests.

Results and Discussion
Progestrone pessaries retention rate was 94.4 % and non-retention rate was 5.6 % for P$_4$P treatment group (Table 1). Muco-purulent and sometimes pungent smelling vaginal discharge was observed in five (27.8 %) does at the time of P$_4$P 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 synchronisation. 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 was 88.9 %, 33.3 % and 37.5 % for PGF$_{2α}$, P$_4$P and Control groups respectively. The oestrus response rate for PGF$_{2α}$ treatment was higher than those of the P$_4$P and Control groups; there was significant (P < 0.05) difference. Spontaneous oestrus response of the Control group was higher than that of P$_4$P 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,P) 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,P (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 & Pasanya, 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,P 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,P 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,P 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,P 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 PGF$_{2\alpha}$ is used for oestrus synchronisation in RSG. It was concluded that PGF$_{2\alpha}$ double injection, 12-days apart and Progesterone pessaries (P,P) 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**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Pessaries retention</th>
<th>Oestrus response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lost</td>
<td>Retained</td>
</tr>
<tr>
<td>Prostaglandin F$_2$-alpha; n = 18</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Progesterone pessaries; n = 18</td>
<td>1 (5.6 %)</td>
<td>17 (94.4 %)</td>
</tr>
<tr>
<td>Control; n = 16</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total (n = 52)</td>
<td>1 (5.6 %)</td>
<td>17 (94.4 %)</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Days</th>
<th>*Prostaglandin F$_2$- alpha</th>
<th>Progesterone pessaries</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 (0.0 %)</td>
<td>3 (16.7 %)</td>
<td>0 (0.0 %)</td>
</tr>
<tr>
<td>2</td>
<td>3 (18.8 %)</td>
<td>0 (0.0 %)</td>
<td>1 (6.3 %)</td>
</tr>
<tr>
<td>3</td>
<td>5 (31.6 %)</td>
<td>2 (11.1 %)</td>
<td>0 (0.0 %)</td>
</tr>
<tr>
<td>4</td>
<td>5 (31.3 %)</td>
<td>0 (0.0 %)</td>
<td>(0.0 %)</td>
</tr>
<tr>
<td>5</td>
<td>3 (18.8 %)</td>
<td>0 (0.0 %)</td>
<td>2 (12.5 %)</td>
</tr>
<tr>
<td>6</td>
<td>0 (0.0 %)</td>
<td>0 (0.0 %)</td>
<td>2 (12.5 %)</td>
</tr>
<tr>
<td>7</td>
<td>0 (0.0 %)</td>
<td>1 (5.6 %)</td>
<td>1 (6.3 %)</td>
</tr>
<tr>
<td>Total</td>
<td>16 (88.9 %)</td>
<td>6 (33.3 %)</td>
<td>6 (37.5 %)</td>
</tr>
</tbody>
</table>

*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.

Acknowledgements
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Conflicts of Interest
The authors declare they have no conflict of interest.

References


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