# OESTRUS RESPONSES USING DOUBLE TREATMENTS OF $PGF_{2\alpha}$ (LUTALYSE® AND SYNCHROMATE®) IN NIGERIAN JENNIES

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## ABSTRACT

This study was carried out to evaluate oestrus responses using double treatments of $pgf_{2\alpha}$ (Lutalyse® and Synchromate®) in Nigerian jennies. Eight (8) cycling jennies aged 3.8 ± 2.0 years were used for this study. The jennies were randomly assigned to 2 groups of 4 jennies each; Group 1 (n=4): jennies treated with a double injection of 10mg of Lutalyse®; Group 2 (n=4): jennies treated with double injection of 375µg of Synchromate®. Blood was collected from the jennies for extraction of serum, for progesterone and oestradiol estimation using Enzyme-Linked Immunosorbent Assays (ELISA). Groups 1 and 2, had time to onset of oestrus of 3.98 ± 0.95 and 1.78 ± 0.29 hours ($P>0.05$), duration of oestrus of 78.0 ± 22.7 and 120 ± 16.97 hours ($P<0.05$), oestrus response rate of 75 and 100% and intensity of synchronization within 48 hours was 75 and 100% ($P<0.01$), respectively. From this study it was established that the oestrus period and oestrus cycle length of groups 1 and 2 was 8 and 15 days and also 17 and 21 days, respectively, in Nigerian indigenous jennies. In conclusion, Synchronization of jennies is possible using exogenous $PGF_{2\alpha}$, however, double treatment of Cloprostenol Sodium (Synchromate®) had a better response, therefore, it is more efficient than double treatment of Dinoprost tromethamine (Lutalyse®) in oestrus synchronization of jennies.

**Keywords:** Nigerian jennies, oestrus responses, double treatment with Lutalyse, double treatment with Synchromate, oestrus period, oestrus cycle.

## INTRODUCTION

Donkey rearing in Nigeria started with the introduction of different donkeys breeds through trans-sahara caravan trade across the nile via the sudan and chad (Fielding and Starkey, 2004). In Nigeria, donkeys help to transport people, carry water from deep wells and rivers, and serve hersmen during seasonal migration throughout Nigeria. In urban areas, donkeys provide small-scale services, such as transportation of building materials and grains, particularly in the northern part of the country, hence the title "beasts of burden" (Blench, 2004). A succesful oestrus synchronization program requires an understanding of the oestrus cycle and research has dramatically increased the number of synchronization options. A producer has many choices to pick from to tailor a synchronization options. A producer has many choices to pick from to tailor a synchronization protocol to his operation, his production goals and his available labour (Weems *et al.*, 2006). One of the oldest ways to synchronize oestrus is by using luteolytic agent such as prostaglandin $F_{2\alpha}$ or one of its analogues, which causes the regression of the corpus luteum (Weems *et al.*, 2006). Prostaglandin $F_{2\alpha}$ acts in oestrus synchronization by terminating the luteal phase through regression of the corpus luteum. Prostaglandins are used only during the breeding season as not all stages of the oestrus cycle are similarly receptive to prostaglandin treatment (Ataman and Akoz, 2006). Cloprostinol contains the synthetic analogue of the naturally occurring $PGF_{2\alpha}$ (dinoprost) as the sodium salt. Each ml contains 250 µg/ml of cloprostenol sodium. In the reproductive system, it plays a role in ovulation, luteolysis, gamete transport, uterine motility, expulsion of foetal membranes. In the ewe, oestrus occurs 2-5 days after luteolysis following intramuscular injection for 250µg either twice at a 5 to 14 day interval (Jainudeen and Hafez, 2000).

Dinoprost tromethamine contains naturally occurring Prostaglandin-$F_{2\alpha}$ (dinoprost) as the tromethamine salt. Injection of 5 ml lutalyse intramuscularly either once or twice at a 9 to 12

day interval will result in oestrus 1 to 5 days after injection (Fred and Doug, 2012).

The specific objective of this study was to evaluate oestrus responses using double treatments of $PGF_{2\alpha}$ (lutalyse® and synchromate®) in Nigerian jennies.

## MATERIALS AND METHODS

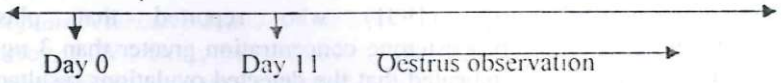
### Study area, experimental animals and management

This study was carried out at the donkey farm of the Equine and Camel Research Programme of the National Animal Production Research Institute (NAPRI), Ahmadu Bello University, Shika Zaria. Eight (8) cycling Jennies aged 3.5 ± 1.0 years with mean body weight of 100.6 ± 6.5kg and mean body condition score of 3.5 ± 0.2 were used for this study. The jennies were kept outdoors in a group and fed *Digitaria smutsii* (woolly finger grass), concentrate rations at 1.2kg/jennies/day and hay as basal diet, water was provided *ad libitum*.

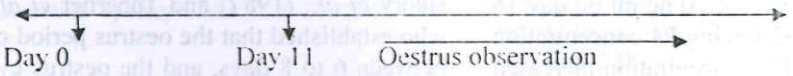
### Experimental design

The animals were randomly assigned to 2 groups of 4 jennies each

**Group 1:** Four jennies were synchronized with a double treatment of 10mg of $PGF_{2\alpha}$ (Dinoprost tromethamine- Lutalyse®) intramuscular injection.




**Group 2:** Four jennies were synchronized with double treatment of 375µg of $PGF_{2\alpha}$ (Cloprostenol sodium- Synchromate®) intramuscular injection, at 11 days apart.




The following oestrus characteristics were also recorded:

Duration of oestrus, onset of oestrus, oestrus response rate and intensity of synchronization.

### Blood Sampling and Hormone assays

Five (5) ml of blood from jenny was obtained from the jennies via jugular veni-puncture using a 5 ml syringe (18 Gauge needle) on the day of synchronization, then twice weekly for 8 weeks, to determine the progesterone and oestradiol concentrations. The blood samples were decanted into vacutainers and transported to the laboratory. Blood samples collected was centrifuged at 2000×G and serum harvested. Serum samples obtained were appropriately stored at -20°C until analysis, for determining progesterone and oestradiol concentration, these were measured in the serum using enzyme-linked immunosorbent assays (ELISA). The ELISA kits were obtained from Monobind® Inc, USA. The kits were used according to the manufacturer's specifications.

### Data analysis

One way analysis of variance model was used. Oestrus response rate and intensity of synchronization were expressed as percentages. Data on progesterone and oestradiol profile values, duration of oestrus and time to onset of oestrus, were expressed as Mean ± S.E.M. Comparisons between the groups were carried out using one way ANOVA and T- test. The differences were considered significant when $P < 0.05$, highly significant when $P<0.01$ and not significant when $P > 0.05$. SAS system for windows 9.0 was used for the analysis.

## RESULTS

**Progesterone and Oestradiol profiles for Group 1 (Double treatments lutalyse)**

The serum progesterone ($P_4$) and oestradiol ($E_2$) profiles for group 1 as shown in Figure 1. The progesterone and oestradiol concentrations were inversely related. Mean serum $P_4$ concentration increased from 6.53 ± 5.59 ng/ml at first $PGF_{2\alpha}$ injection to 9.10 ± 4.82 ng/m 11 days later when the second $PGF_{2\alpha}$ was injected while the $E_2$ concentration decreased from 18.98 ± 8.36 pg/ml to 18.46 ± 10.39 pg/ml. $P_4$ concentration started to decline after the second $PGF_{2\alpha}$ injection from day 11 at 9.10 ± 4.82 ng/m to 0.50 ± 0.10 on day 18 and $E_2$ concentration rose from 18.46 ± 10.39 pg/ml to 20.65 ± 11.6 pg/ml on day 21.

**Progesterone and Oestradiol profiles for Group 2 (Double treatments synchromate)**

The serum progesterone (P4) and oestradiol (E2) profiles for group 2 as shown in Figure 2. Mean P4 concentration was 5.36 ± 2.64 ng/ml on the day of first PGF2α injection then declined to 0.83 ± 0.59 ng/m 11 days later, while E2 concentration decreased from 9.02 ± 2.58 pg/ml to 7.21 ± 2.82 pg/ml. The second PGF2α was injected on day 11, P4 concentration rose from 0.83 ± 0.59 ng/m to 5.60 ± 2.20 ng/ml on day 18 then declined on day 32 having P4 concentration of 0.35 ± 0.12 ng/ml, E2 concentration increased from 7.92 ± 1.08 pg/ml after the second treatment to 12.73 ± 3.08 pg/ml on day 32.

## DISCUSSIONS

In this study, luteolysis and onset of oestrus was earlier in group 2 (double treatment synchromate) and later in group 1 (double treatment lutalyse). It was established that the time to onset of oestrus in the two treatment groups in this study were shorter than the work of Getachew, (2014), who observed that heat was induced 86.4 hours post $PGF_{2\alpha}$ administration. This difference could be attributed to the differences in dosage of $PGF_{2\alpha}$, and also the sensitivity of the corpus luteum to the different treatments. The observed shorter time to onset of oestrus in group 2 (Synthetic $PGF_{2\alpha}$) as compared to groups 1 (Natural $PGF_{2\alpha}$) in this study contradicts the work of Recai *et al.*, (2013) who reported that sheep treated with natural $PGF_{2\alpha}$ had shorter time to onset of oestrus than those treated with synthetic $PGF_{2\alpha}$, this difference could be as a result of different dosages used in the studies and also the species differences. The duration of oestrus was 78.0 and 120 hours in Groups 1 and 2, respectively, and this differs from the report of Henry *et al.*, (1991) who reported a longer duration of oestrus. The 100% oestrus response rate and intensity of synchronization in this study corroborates the findings of Ozturkler *et al.*, (2003) and Godfrey *et al.*, (1997), who also observed 100% oestrus response rate in ewes treated with the synthetic $PGF_{2\alpha}$ than the natural $PGF_{2\alpha}$. The jennies used for this study were in their different reproductive phases, the progesterone and oestradiol levels of all the groups were inversely related, as progesterone peaks, oestradiol decline and this agrees with the normal physiology of these hormones. The mean $P_4$ concentration was 6.53 ng/ml and 5.36 ng/ml on day 0 in groups 1 and 2, and this corroborates with the work of Henry *et al.*, (1991) who reported that plasma progesterone concentration greater than 3 ng/ml indicated that the detected ovulations resulted in active corpus luteum. It was established from this study that the oestrus period of groups 1, and 2 was 8 and 15 days, respectively. The oestrus cycle length of groups 1 and 2, was 21 and 17 to 21, these findings are similar to the work of Henry *et al.*, (1987) and Taberner *et al.*, (2008) who established that the oestrus period can occur between 6 to 8 days, and the oestrus cycle from 25 to 26 days.

In conclusion, Synchronization of jennies is possible using exogenous $PGF_{2\alpha}$, however, double treatment of Cloprostenol Sodium (Synchromate®) had a better response, therefore, it is more efficient than double treatment of Dinoprost tromethamine (Lutalyse®) in oestrus synchronization of jennies.

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**Table 1. Oestrus characteristics of jennies in the two treatment groups.**

| Parameters/Groups | Grp1 (2LT) | Grp2 (2SH) | LS |
|---|---|---|---|
| Onset of oestrus (hours) | 3.98±0.95[a] | 1.78±0.29[b] | * |
| Duration of oestrus (hours) | 78.0±22.7[b] | 120±16.97[a] | ** |
| Oestrus response rate (%) | 75[b] | 100[a] | *** |
| Intensity of synchronization (%) | 75[b] | 100[a] | *** |

[a,b] Different superscript indicates statistical significant differences (P<0.05). LS- Level of significance

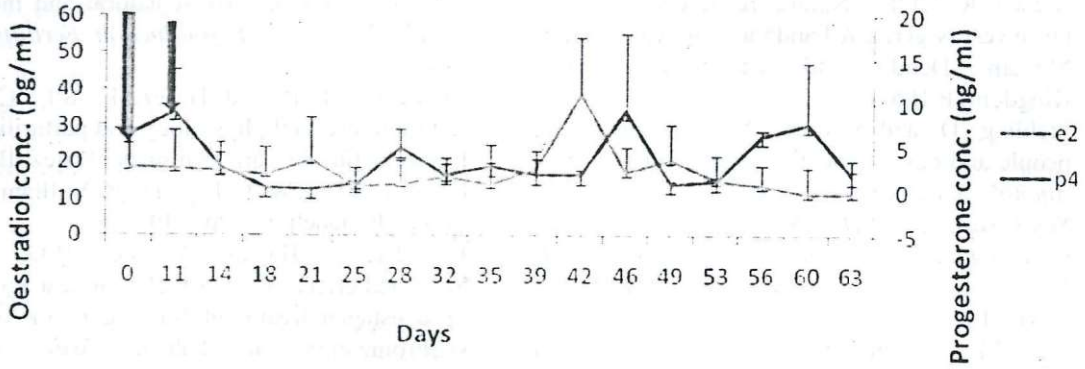


Figure 1 Progesterone and oestradiol profiles of Jennies treated with double injections of 10 mg of $PGF_{2\alpha}$

Keys: Day 0= Day of first injection of 10mg of Lutalyse®.

Day 11= Day of second injection of 10mg of Lutalyse®.

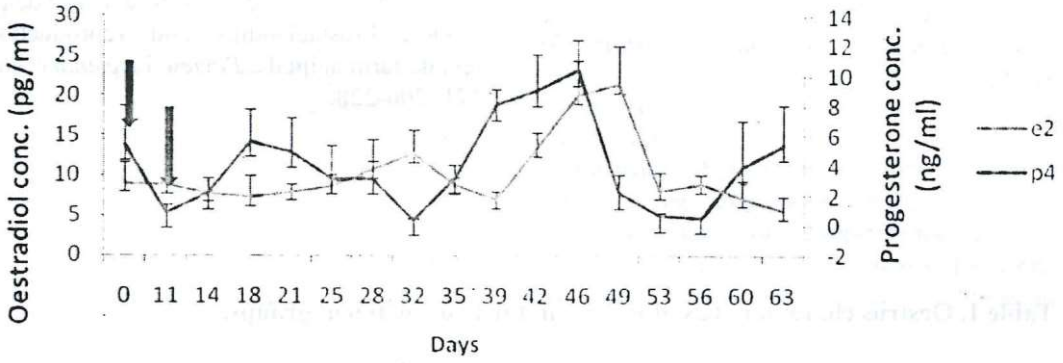


Figure 2 Progesterone and oestradiol profiles of jennies treated with double injections of 375µg of $PGF_{2\alpha}$

Keys:

Day 0= Day of first injection of 375µg of Synchromate®

Day 11= Day of first injection of 375µg Synchromate®