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Progesterone Profiles Of Cross Bred Sows Following Double and Triple Injections of Dinoprost Tromethamine (Lutalyse®) Treatments

Oke, B. E[1].,Bawa, E. K [2]., Nwannenna, A. I[3].,Hassan, R[3].Bello, T. K[3].
[1] *Department of Theriogenology*
[2]*Department of Theriogenology and Production,*
[3]*Biotechnology Research Programme,*
[1]*College of Veterinary Medicine, Federal University of Agriculture Makurdi-Nigeria*
[2] *Faculty of Veterinary Medicine, Ahmadu Bello University of Agriculture Zaria-Nigeria*
[3,4]*National Animal Production Research Institute, Ahmadu Bello University, Zaria-Nigeria*

Abstract
This study was carried out to evaluate progesterone profile of cross bred sows in Zaria following treatments with double and triple injections of Dinoprosttromethamine(Lutalyse®). Ten (n = 10) apparently healthy cross bred sows were randomly assigned to 2 treatment groups based on number of injections of Lutalyse®. Group 1 (n=5) received two injections of Lutalyse® (12.5mg) (days 0 and 13) while Group 2 (n=5) received three injections of Lutalyse® (12.5mg) (Day 0, 7, 13). Oestrus was monitored twice daily from 0700 – 1000 and 1500 – 1800h. Data on progesterone profile obtained during the oestrous cycle were expressed as mean ± SEM. Student t-test was used to compare the mean values between the groups. Graphpad Prism® data package for windows (2009) was employed for all statistical analyses. A value of P < 0.05 was considered significant. There was no statistical significant (P > 0.05) difference in the overall mean serum P4 concentrations between groups 1 and 2. It is concluded that dinoprosttromethamine sodium can be used to synchronize sow oestrus, both double and triple injections of dinoprosttromethamineproduces similar effect on progesterone concentration. It is recommended that double injections of dinoprosttromethamineshould be used for oestrus synchronization as no statistical significant (P>0.05) differences were observed in the progesterone concentrations of both groups.

Keywords: *Progesterone concentration, Dinoprosttromethamine, cross bred sows, Oestrus, Synchronization*

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I. Introduction

Pig production represents the fastest way of increasing animal protein since pigs grow at a faster rate and reproduce sooner with large number of offspring than cattle, sheep or goats (Ajala, 2003; McGlone, 2013). Understanding the regulation of the oestrous cycle is essential for successful implementation of a synchronization protocol which allows manipulation of oestrus and ovulation hence allowing a fixed-time artificial insemination or natural mating which is of great benefit for pig farms that operate using batch farrowing (Brown, 2006).

Oestrus synchronization is a valuable management tool for increasing the pregnancy rate in pigs (Brüssow and Wahner, 2011). Several techniques have been developed to induce oestrus. Oestrus synchronization methods in the sow vary and are all based either on controlling events leading to follicular maturation and ovulation or altering luteal lifespan (Estill, 2000). Prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) is not luteolytic in the sows until about day 12 of the oestrous cycle (De Rensis*et al*., 2012; Kouamo and Kamga-Waladjo, 2013; Tur, 2013). The insensitivity of sow's CL to the luteolytic effect of $PGF_{2\alpha}$ before day 12 is considered to preclude the use of prostaglandin in oestrus synchronization programmes for swine (Przygrodzka*et al*., 2015).

In swine, ELISAs have been used for determining pregnancy via progesterone (P4) concentrations in serum, plasma, blood, saliva, and feces (Sanders *et al*., 1994; Moriyoshi*et al*., 1997). Serum P4 concentrations measure luteal function and, thus, the pregnancy and oestrous status of the sow (Althouse and Hixon, 1997). To the best of our knowledge, little or no study has evaluated the progesterone profile of cross bred sows treated with double (days 0 and 13) and triple injections (days 0, 7 and 13) of dinoprosttromethamine (Lutalyse®). The underlying objective of this study was to check for progesterone profile using competitive ELISA following double injections (days 0 and 13) and triple injections (days 0, 7 and 13) of dinoprosttromethamine (Lutalyse®) injections.

II. Materials And Methods

Study Location

The study was carried out at the Swine and Rabbit Research Programme of the National Animal Production Research Institute (NAPRI), Shika, Ahmadu Bello University, Zaria.

Experimental Animals and Herd Management

Ten (n = 10) apparently healthy cross bred sows belonging to the Swine and Rabbit Research Programme of the NAPRI Shika, Zaria were used for this study. The sows between 2 - 3 years of age weighing between 120 and 150 kg. The sows were identified by ear tag numbers.The cross bred sows were fed with diet containing 16% crude protein. The ration was formulated to meet the minimum nutrient requirements for breeding sows and boars as recommended by National Research Council (NRC) (1998). The ingredients for the diet were sourced in NAPRI feed store and the ration was mixed in the feed mill in NAPRI, Shika, Zaria. Water was given *ad libitum.*

Experimental Design

A total of ten (n = 10) cross bred sows were randomly divided into two groups

The experimental group.

Each of the group consists of 5 sows with different treatment protocol.

Group 1 (n=5) – Double injection of Dinoprosttromethamine (Lutalyse®).

Each of the sows received a dose of 12.5mg (2.5 ml) dinoprosttromethamine on days 0 (day of first injection) and 13 (day of second injection). The sows were then monitored for signs of oestrus. Those found in oestrus were bred using natural breeding.

Group 2 (n=5) – Triple intramuscular injection of Dinoprosttromethamine (Lutalyse®).

Each of the sows received a dose of 12.5mg (2.5 ml) of dinoprosttromethamine on days 0 (day of first injection), 7(day of second injection) and 13 (day of third injection). The sows were also monitored for signs of oestrus (Figure 3.1). Those found exhibiting signs of oestrus were bred using natural breeding.

Oestrus Detection and Mating

The cross bred sows were observed visually for behavioural oestrus manifestation twice (0700-1000 and 1500-1800 h) daily from commencement of the study for 21 days. Sows were considered to be in oestrus when they stood to be mounted by females (homosexual mount) or male (heterosexual mount).

Blood Sampling

Five (5) milliliters of blood was collected via the posterior vena cava, using a 10-ml hypodermic syringe, fitted with 18 gauge needle, from the sows on days 0, 7, and 13 (just before prostaglandin injection), and once weekly afterwards until confirmation of pregnancy based on non-return rate to oestrus. Blood samples collected in vacutainers without anticoagulant were quickly transported to the laboratory. Serum samples were separated by centrifugation of the blood at 2500G for 15 minutes. The serum samples in vials were appropriately labeled and stored at -20°C until hormone analysis.

Data Analyses

Data on progesterone profile during the oestrous cycle were expressed as mean ± SEM. Student t-test was used to compare the mean values between the groups. Graphpad Prism® data package for windows (2009) was employed for all statistical analyses. A value of $P < 0.05$ was considered significant.

III. Results

Table 1: Progesterone profile of cross bred sows treated with double and triple injections of Lutalyse® (Dinoprosttromethamine).

Days	Grp 1 (n = 5)	Grp 2 (n = 5)
0	4.80 ± 1.86	1.77 ± 1.23
7	7.00 ± 0.95	3.90± 0.38
13	9.87 ± 1.20	3.87 ± 1.86
20	0.80 ± 0.36	0.63 ± 0.20
27	0.63 ± 0.19	4.30 ± 1.23
34	5.50 ± 0.29	6.80 ± 0.64
41	7.30 ± 0.32	7.90 ± 0.72
48	10.83 ± 0.75	10.97 ± 1.01

n=number of animals in each group. There was no statistical significant (P > 0.05) difference in the overall mean serum P4 concentrations.

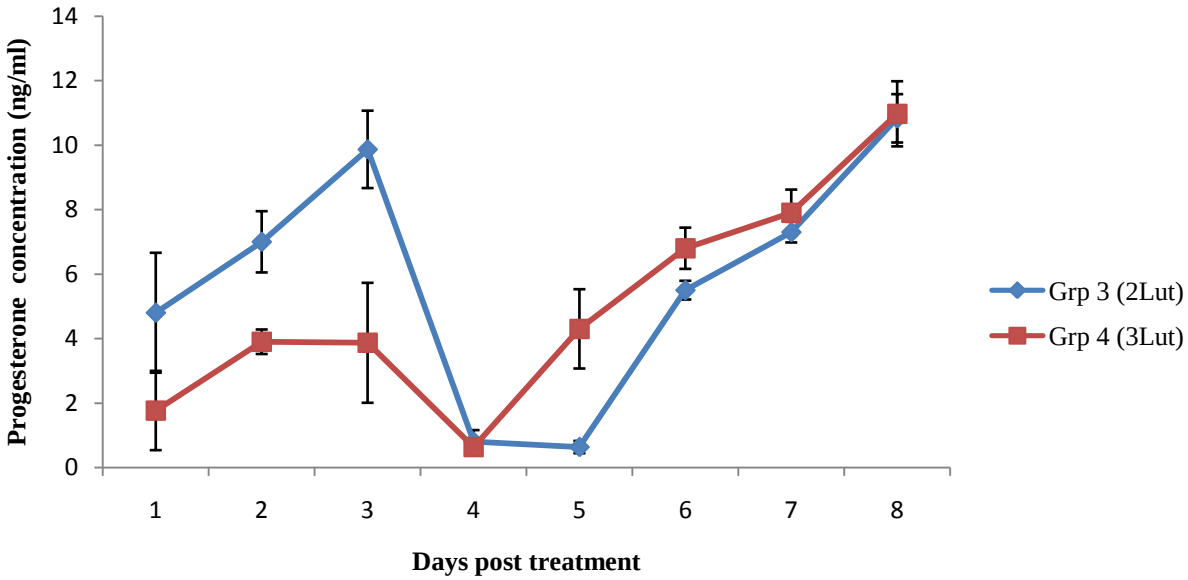

Figure 1: Progesterone profile of sows treated Lutalyse® (Dinoprosttromethamine).

IV. Discussion

In group 1 the basal p4 concentration (4.8 ± 1.86ng/ml) was elevated (7.00 ± 0.95ng/ml) after the first dose of $PGF_{2\alpha}$ which indicates that luteolysis has not taken place and that the animals were in their early luteal phase and reports has shown non responsiveness of porcine CL to exogenous $PGF_{2\alpha}$ as reported by De Rensis*et al*. 2012 and Kouamo and Kamga, 2013. Luteolysis (0.80 ± 0.36ng/ml) was reported following the second injection of $PGF_{2\alpha}$ which is in agreement with that reported by De Rensis*et al*. 2012. Pregnancy was established (10.83 ± 0.75ng/ml) which was also in agreement with that reported by Boma and Bilkei (2008).

In group 2 (triple injection of Lutalyse®) the basal p4 concentration (1.77 ± 1.23ng/ml) indicates that the animals were in their proestrus because no observable signs of oestrus was seen but following the first dose of $PGF_{2\alpha}$ there was a slight though not significant decline in the p4 concentration (3.90 ± 0.38ng/ml). Luteolysis with observable oestrus signs were reported in this study following the third injection of $PGF_{2\alpha}$(0.63 ± 0.20ng/ml) which is in agreement with the works of De Rensis*et al*. 2012, Kouamo and Kamga, 2013 and Przygrodzka*et al*. 2015.. Pregnancy was established (10.97 ± 1.01ng/ml) which was also in agreement with that reported by Boma and Bilkei (2008).

V. Conclusion And Recommendation

From this study, it was observed that:

1. Dinoprosttromethamine (Lutalyse®) has luteolytic effect on porcine CL and can be used to synchronize sows to enhance productivity.
2. Effects of double injection and triple injection of Dinoprosttromethamine (Lutalyse®) on progesterone concentration were similar.
3. Double injection of Dinoprosttromethamine (Lutalyse®) at 13 days apart should be used by farmers and researchers as this will save cost and labour.

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