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Progesterone profile of red Sokoto does treated with prostaglandin F2-alpha and progesterone sponges for clinical application

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Abstract

Progesterone profiles of Red Sokoto does were evaluated for clinical application. Fifty-one Red Sokoto goats does were assigned into three groups: (a) prostaglandin F_2-alpha (n = 17), and given double injection of prostaglandin F_2-alpha at 12-days interval; (b) progesterone sponges (n = 17), and administered progesterone sponges, inserted for 12-days; and (c) control (n = 17), no treatment. Blood samples were collected from all groups from day 0 to 6, day 9, day 12 to 15, day 19, and day 21 to 23 for progesterone profile. Group A had four profiles: 1) does in luteal phase at first and second injections; 2) does in luteal phase at first injection but insensitive at second; 3) does in follicular phase at first injection but luteal phase at second; 4) does, insensitive at first and second injections. Group B profile were: 1) does in luteal phase at sponge insertion; 2) does in luteal phase with decreased progesterone concentration; 3) does in follicular phase at sponge insertion; 4) does with insensitive corpus luteum at sponge insertion. It was concluded that progesterone profile assisted in describing exhibitions and non-exhibitions of behavioural oestrus in Red Sokoto does.

Introduction

Few reports are available on the progesterone profile of goats, particularly Red Sokoto does, for clinical use. Kawu *et al.* (2007) reported peripheral serum progesterone profile in multiparous Nigerian Red Sokoto goats, while Akusu *et al.* (1994) worked on peripheral plasma levels of progesterone during the reproductive cycle of West African dwarf (WAD) goats. There is a need for more research in this area, as suggested in previous reports. To this effect, this study described the progesterone profile of the Red Sokoto goat does following treatment with prostaglandin F_2-alpha ($PGF_2\alpha$) and Progesterone sponge (P_4S) for clinical application in goats.

Materials and Methods

The Small Ruminant Research Program (SRRP) of the National Animal Production Research Institute

(NAPRI) Shika, Ahmadu Bello University, Zaria, was used for the study. Fifty-one does and 6 bucks were used for the study. A pre-experimental observation period of three months was to establish cyclicity; carryout ballottement; conduct body condition score (BCS – Pullan, 1978) and age (Records; dentition - Clair, 1975) were used to select animals. Does were randomly assigned to three groups of A, B and C comprising 17 does each. The groups were assigned to specific pens which were maintained throughout the experiment. Group A, oestrus was synchronised with prostaglandin F_2-alpha ($PGF_2\alpha$) (Dinoprost tromethamine – Lutalyse®); and group B, progesterone sponges (P_4S) containing 30mg Cronolone (Florogestone Acetate, Intervet company, France for: Intervet UK Limited, while group C served as control). Each group contained two apronised bucks as heat detectors. Concentrate feed had metabolizable energy (ME) of 11.7mJ/kg DM, and 15% CP formulated for body maintenance and reproduction.

The $PGF_2\alpha$ treatment dose was 12.5 mg per animal by deep intra muscular injection. The protocol adopted was the double injection, 12-days apart. Progesterone sponges were inserted using an applicator following lubrication and remained intravaginal for 12 days before removal. No treatment was given to the control. Apronised bucks and visual observation were employed in oestrus detection. Two apronised bucks were introduced to each group from the day of commencement of the experiment and maintained till the end of experimental period. Visual observation was intensive and non-intensive. Intensive heat detection was carried out for 24 h daily, and for seven consecutive days after each $PGF_2\alpha$ injection and period during which progesterone sponge was intravaginal; involving five oestrus detectors at six hourly. Non-intensive was for four hours (8 to 10 h and 16 to 18 h) daily and carried out immediately whenever the intensive ended.

Blood samples were collected from all groups for the first seven days (day 0 to 6), day 9, day 12 to 15, day 19, and day 21 to 23 post-breeding in bred does. Five mL of whole blood was collected via a jugular veni-puncture, serum was recovered by centrifuging at 3,000 g and stored at - 20° C until assayed for progesterone. The 'Coat-A-Count' progesterone kit (Diagnostic Products Corporation, Los Angeles, USA)® Supplied by FAO/IAEA was used to assay for serum progesterone. It is a no-extraction solid phase 125I-progesterone radioimmunoassay (RIA) technique. The intra-and-interassay coefficients of variation were 7.5 % and 8.2 %, respectively. Progesterone concentration equal to or greater than 0.1 ng/mL was used as evidence of luteal activity as previously described by Kawu *et al.* (2007). Progesterone concentrations were expressed as mean and standard deviation (± SD). Breeding of does that came into oestrus (stand-to-be-mounted) was carried out following the second $PGF_2\alpha$ injection and when progesterone sponges were removed. Does were isolated, identified and bred in the breeding pen with a breeding buck selected for the experiment.

Results and Discussion

Results for prostaglandin F2-alpha ($PGF_2\alpha$) group showed 6.07 ± 7.77 ng/mL for day 0 and 12.59 ± 6.27 ng/mL for day 12 indicating high progesterone concentration levels; and concentrations declined to basal levels of 0.55 ± 0.48 ng/mL and 0.45 ± 0.81 ng/mL within 24 to 48 h for first and second $PGF_2\alpha$ injections, respectively. Consequently, behavioral oestrus was exhibited. Basal levels of progesterone concentrations were maintained until after breeding it then increased steadily to high levels (17.18 ± 5.83) (Figure 1). The profile of progesterone obtained during this study was similar to the reports of Akusu (2003) in WAD does; Voh Jr *et al.* (1987) and Voh Jr. (1996) in cattle and Bello (2011) in RSD. Good knowledge of progesterone profile in animals results in proper application in clinical practice. Classification of cycling does into luteal and follicular phases of the oestrous cycle and to anoestrus or non-cycling does is important. This will minimize errors in the application of $PGF_2\alpha$ which has been established to work effectively in the luteal phase. This classification was not possible before agent administration pre-experimentally, hence, treatment was blindly carried out, and consequently, the variable responses as shown in Figures 2 and 3. The classification need thus highlights any effect directed towards it for practical application as observed by Bello *et al*. (2019). The progesterone profile showed four distinct groups (Figures 2 and 3). Does in follicular phase and anoestrus would have been eliminated at the start of experiment. However, does in the luteal phase responded to first $PGF_2\alpha$ injection but did not respond to the second injection probably due to insensitivity, while some does that responded to the second after the first, did that much later, probably due to the same reason. Does in follicular phase responded to the second injection only; and in

does not cycling progesterone concentration remained at basal level throughout or undetectable. Findings are similar to the report of Bello (2011) in the RSD. Progesterone sponge (P_4S), progesterone concentration was elevated from 6.09 ± 7.76 ng/mL (day 0) to 13.47 ± 6.87 (day 12) post insertion. Luteal levels of progesterone concentration were high and maintained to inhibit oestrus for the duration for which sponge was inserted intravaginal, and progesterone concentration decline to basal levels of 0.59 ± 0.33 to 0.83 ± 0.79 ng/mL post sponge withdrawal within 24 to 48 h. Consequently, behavioral oestrus was exhibited. After breeding progesterone increased steadily to high levels (15.39 ± 5.23) (Figure 1). Progesterone sponge group equally had similar profile. Those in luteal phase with matured *corpus luteum* had their concentrations increased and maintained until withdrawal of sponges, then came on oestrus thereafter. Does in luteal phase were insensitive but maintained a basal concentration level, after withdrawal also came on heat thereafter. However, it was observed that some does in luteal phase had a sharp decline in progesterone concentration after insertion (Figure 3) and came on oestrus few days later. This may probably be the coincidental effect of some internal factors such as prostaglandin F2-alpha lysing the *corpus luteum*, since the stage of the oestrous cycle was not known. Does in early follicular phase at insertion, came on oestrus within 24 to 48 hours, while the non-cycling or anoestrus does had non-detectable progesterone concentrations or remained at basal level (Figure3). The initial release rate of progesterone following sponge insertion in the present work was high enough to inhibit ovulation; as opposed to the situation (especially in bovine) whereby extra progesterone is required at the start of treatment when progestagen will have an effect on the pattern of response (Voh Jr., 1996).

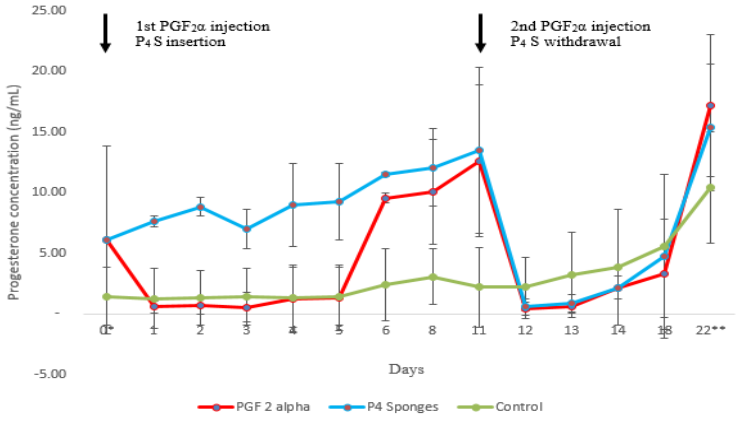

Figure 1: Peripheral serum progesterone concentration profiles of prostaglandin F_2-alpha, progesterone sponges and control treatments in Red Sokoto goat does

NB: P_4 S – progesterone sponges, * Day of treatment and beginning of blood sampling, ** Day 23 post-breeding and end of blood sampling (Day 21 and 22 not indicated)

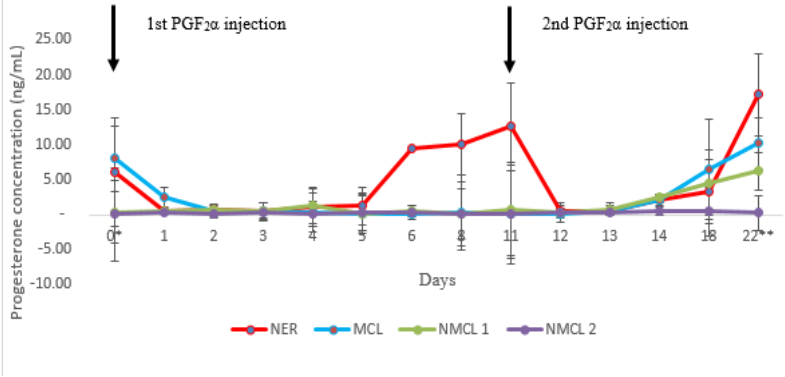

Figure 2: Peripheral serum progesterone concentration profile of prostaglandin F_2-alpha treatments in Red Sokoto goat does

NB: * Day of treatment and beginning of blood sampling.

** Day 23 post-breeding and end of blood sampling (Day 21 and 22 not indicated).

NER – Normal Expected Response: does in luteal phase with matured corpus luteum at first and second PGF_2-alpha injections and came on oestrus.

MCL – Matured Corpus Luteum: does in luteal phase with matured corpus luteum at first PGF_2-alpha and "no matured corpus luteum" at second PGF_2-alpha and came on oestrus.

NMCL1 – No Matured Corpus Luteum 1: does in follicular phase at first PGF_2-alpha injection but in luteal phase at second PGF_2-alpha injection and came on oestrus.

NMCL2 – No Matured Corpus Luteum 2: does with no matured corpus luteum" at first and second PGF_2-alpha injections and did not come on oestrus - appear not to be cycling

Control, progesterone concentration levels was

minimal and consistent from 1.26 ± 2.49 to 1.44 ± 2.35 within 168 h until after breeding when it increased steadily to high levels (10.44 ± 4.61) (Figure 1). It was concluded that progesterone profile of prostaglandin F_2-alph and Progesterone sponges assisted in explaining exhibitions and non-exhibitions of behavioural oestrus following oestrus synchronization with the agents in Red Sokoto does and may be of value in clinical practice.

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Conflict of Interest

The authors declare that there is no conflict of interest.

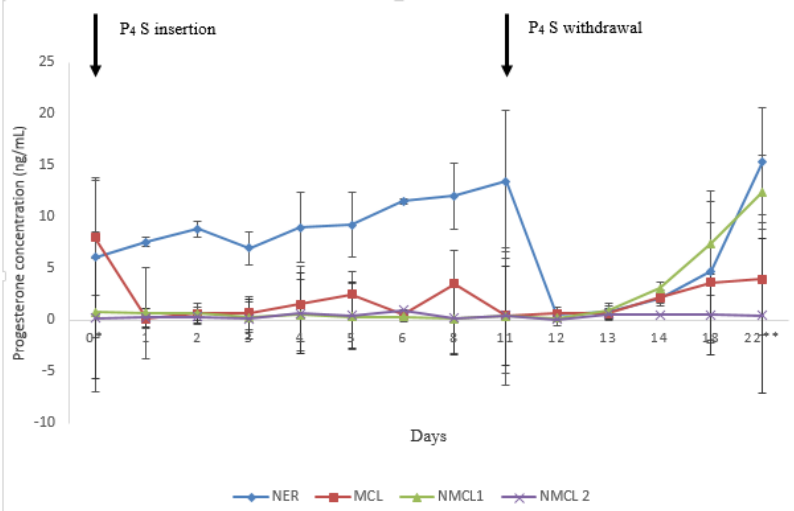

Figure 3: Peripheral serum progesterone concentration profile of progesterone sponges treatments in Red Sokoto goat does

NB: P_4 S – progesterone sponges, * Day of treatment and beginning of blood sampling,

** Day 23 post-breeding and end of blood sampling (Day 21 and 22 not indicated).

NER – Normal Expected Response: does in luteal phase with matured corpus luteum at P4 sponge insertion and came on oestrus at withdrawal.

MCL – Matured Corpus Luteum: does in luteal phase with matured corpus luteum and responded by decreased progesterone concentration at P4 sponge insertion, but came on oestrus at withdrawal.

NMCL1 – No Matured Corpus Luteum 1: does in follicular phase at P4 sponge insertion but came on oestrus at withdrawal.

NMCL2 – No Matured Corpus Luteum 2: does with no matured corpus luteum at P4 sponge insertion and did not come on oestrus at P4 sponge withdrawal - appear not to be cycling

References

Akusu MO (2003). Reproductive Performance of Goats for Maximum Animal Production in Nigeria. Inaugural Lecture, 2002/2003, University of Ibadan, Nigerian.

Akusu MO, Nduka E & Soyebo BA (1994). Peripheral plasma levels A of progesterone and oestradiol-17β in West African dwarf (WAD) goats during oetrus cycles following Oetrus Synchronization. *Tropical Veterinarian,* **12**: 27-36.

Bello AA (2011). Characterisation of Oestrus, Endocrine Events and Fertility in Red Sokoto Goat following Comparative Oestrus Synchronisation with Prostaglandin and Progestagen. MSc. Thesis, Ahmadu Bello University, Zaria, Nigeria. Pp 55 - 63.

Bello AA, Voh Jr AA, Ogwu D & Tekdek LB (2019). Oestrus Synchronisation in Red Sokoto Does Treated with Prostaglandin F2α and Progesterone Pessaries. *Sokoto Journal of Veterinary Sciences,* **17**(2): 65 – 68.

Clair LE (1975). Permanent Teeth. In: *Anatomy of the Domestic Animals* Sissian and Company edition. Pp 866 - 873.

Kawu M, Eduvie L, Lakpini C & Ayo J (2007). Peripheral serum progesterone profile in multiparous Nigerian Red Sokoto Goats between day one and 30 postpartum. *Veterinary Archives,* **77**(6): 543-550.

Pullan NV (1978). Condition Scoring of White Fulani Cattle. *Tropical Animal Health and Production,* **10**(2): 118 – 120.

Voh Jr AA, Buvanendran V & Oyedipe EO (1987). Artificial insemination of indigenous Nigerian cattle following synchronisation of oestrus with PGF_2-alpha. I. Preliminary fertility trial. *British Veterinary Journal,* **143**(2): 136 - 142.

Voh Jr AA (1996). Fertility and Embryonic Mortality Rates of Zebu Cows following Oestrus Synchronisation and Artificial Insemination. PhD Thesis, Ahmadu Bello University, Zaria, Nigeria, Pp 60 - 75.