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ARTICLE

Oestrus Behaviour and Conception Rates of Red Sokoto Goats Following Treatment with Equine Chorionic Gonadotrophin and Prostaglandin

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SUMMARY

This study was designed to investigate whether the administration of equine chorionic gonadotrophin (EG) concurrent with prostaglandin (PG) treatment improved oestrus response rates of Red Sokoto does. Red Sokoto (RS) does were treated with PGF2α (RSPG; n=10), PGF2α and eCG (RSPGEG; n=10) and eCG (RSEG; n=10). Heat detection and natural mating was carried out using sexually active fertile bucks following treatment for 5 days. Oestrus response rate was higher ($p<0.05$) in the RSPGEG than in the RSPG and RSEG groups respectively. Time to onset of oestrus was shorter ($p>0.05$) while duration of oestrus was longer ($p>0.05$) in the RSPGEG than in the RSPG and RSEG groups. Conception rates were 77 %, 80 % and 0 % in the RSPGEG, RSPG and RSEG groups respectively. We concluded that administration of equine chorionic gonadotropin concurrent with prostaglandin treatment improved oestrus response rates in Red Sokoto does.

Key words: Red Sokoto Goat, Prostaglandin, Gonadotrophin, Oestrus Response, Conception

INTRODUCTION

In Nigeria, goats are household animals providing food in the form of meat and milk to the increasing population (Ezekwe and Lovin, 1997). The increase in demand for meat and milk from goats has necessitated the application of assisted reproduction techniques/technologies such as oestrus synchronization, superovulation, transgenesis and cloning, artificial insemination, embryo transfer, in vitro fertilization, laparoscopic ovum pick-up and intracytoplasmic sperm injection in goat production (Baldassarre and Karatzas, 2004; Holtz, 2005; Silva et al., 2011). The most widespread method of heat synchronization used in goats involves progesterone/progestagen treatment for 9–11 days followed by a luteolytic dose of prostaglandin (or an analogue) administered in the period 48 h prior to sponge removal (Baldassarre and Karatzas, 2004). Progesterone/progestagen treatment may be delivered by means of an intravaginal sponge, a CIDR or a subcutaneous implant (Corteel, 1975; Freitas et al., 1997; Romano, 2002; Abecia at al., 2012). In Nigeria, oestrus synchronization in goats has been achieved using progestagens alone or in combination with gonadotrophins (Omontese et al., 2010; Silva et al., 2011; Omontese et al., 2012; Omontese et al., 2013) and prostaglandins

(Ogunbiyi et al., 1980; Kawu, 2011; Omontese et al., 2013).
The Red Sokoto goat is the most numerous goat breed in Nigeria accounting for over 70 % of the goat population (Osinowo, 1992; Midau et al., 2010). In the tropics, goats breed all year round although fertility may be reduced due to low pasture availability as seen during the dry season (Osinowo, 1992). Oestrus synchronization therefore enables farmers to strategically breed their animals so that kidding would occur during the rainy season where there is abundance of pasture for feeding their livestock.
Equine chorionic gonadotrophin (eCG) is a hormone produced from the serum of pregnant mares (Abecia et al., 2011). It has both FSH and LH activity and has been used to improve oestrus synchronization efficacy following the use of progestagens in goats (Abecia et al., 2012). However, there is a dearth of information on the use of eCG concurrent with prostaglandin treatment in Red Sokoto goats in Nigeria. Therefore the objective of this study was to evaluate the effect of eCG administration concurrent with prostaglandin treatment on oestrus response and conception rates in Red Sokoto goats.

MATERIALS and METHODS

Location, Housing and Management
This study was carried out at the National Animal Production Research Institute (NAPRI), Ahmadu Bello University, Zaria. NAPRI is located in the Northern Guinea Savannah zone of Nigeria between latitude 110N and 12 0N and between longitude 70E and 8 0E at an elevation of 650 m above sea level with an average annual maximum and minimum temperature of 31.0±3.2 0C and 18.0±3.7 0C respectively. The region has an average annual rainfall of 1100 mm usually lasting from May to October with a mean relative humidity of 72 %. Does were housed in a pen and allowed to graze within large paddocks, fed Digitaria smutsii (wooly finger grass) hay; concentrate supplement (0.5 Kg/day), and water provided ad libitum.

Animals and hormonal treatment
Red Sokoto does (n=30) weighing between 17 to 21kg with body condition scores (BCS, range 1-5) 2.5- 3.5 (Spahr, 2005) and aged between 2-3 years were used for this study. Does were divided into three treatments (RSPGEG, n=10; RSPG, n=10 and RSEG, n=10). The RSPGEG group received intramuscular 10 mg prostaglandin (Lutalyse®, Pfizer, USA) plus 200 IU equine chorionic gonadotrophin (PMSG, Intervet, Ireland), the RSPG group received intramuscular 10 mg prostaglandin (Lutalyse®, Pfizer, USA) intramuscular while the RSEG group received 200 IU equine chorionic gonadotrophin (PMSG, Intervet, Ireland) only intramuscular.

Oestrus detection and natural mating
Following treatment, does were grouped with sexually active Red Sokoto bucks in the ratio 1:10 (Abecia et al., 2012). Does were observed visually for behavioural oestrus manifestations twice (0700-1000 and 1500- 1800 hours) daily for 5 days. Does were recorded in oestrus when they stood immobile to be mounted by the sexually active bucks. Oestrus response was calculated as the number of does that showed standing oestrus and were subsequently mated, over the total number of does in each treatment group, expressed in percentage. Time to onset of oestrus was calculated as the interval between administration of treatment and standing oestrus (heat) following exposure to the bucks expressed as mean ± standard error of mean (SEM). Duration of induced oestrus was evaluated as the interval between the first and last standing oestrus expressed as the mean ± standard error of mean (SEM). Conception rate was calculated as the number of does bred that fail to return to oestrus 19 to 21 days after natural mating divided by the number of

does mated in each treatment group and expressed as a percentage.

Statistical analyses

All data was analyzed using one way analysis of variance to compare means between treatment groups. ANOVA was used to evaluate the effect of treatment on oestrus parameters. Graph pad Prism® statistical package was used for all analyses. Values of $p < 0.05$ were considered significant.

RESULTS

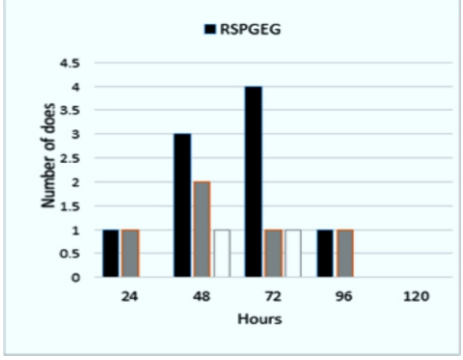
The results of this study show that the administration of equine chorionic gonadotropin increased oestrus response rates in Red Sokoto does (Table I). On the other hand, no significant ($p<0.05$) differences were observed in the time to onset of oestrus and duration of oestrus between groups (Table I). Conception rates did not differ between groups (Table I). Oestrus synchrony was tighter in the group treated with both prostaglandin and equine chorionic gonadotrophin (Figure I).

TABLE I: Oestrus parameters and conception rates of Red Sokoto does synchronized using prostaglandin and equine chorionic gonadotrophin

Oestrus properties	RSPGEG (n=10)	RSPG (n=10)	RSEG (n=10)
Oestrus response rate (%)	9/10 (90) [a]	5/10 (50) [b]	2/10 (20) [c]
Time to onset of oestrus (hours)	29.3 ± 2.1 [a]	32.1 ± 2.3 [a]	31.5 ± 1.7 [a]
Duration of oestrus (hours)	40.8 ± 6.2 [a]	41..1 ± 0.9 [a]	42.4 ± 3.2 [a]
Conception (%)	7/9 (77.78)	4/5 (80)	0/2 (0)

RS= Red Sokoto goat PG = Prostaglandin;
EG= equine chorionic gonadotrophin;
n= Number of does per group; [abc]Mean values along the same row with different superscripts are statistically different ($p<0.05$)

FIGURE I: Tightness of synchrony of Red Sokoto does following treatment with prostaglandin alone (RSPG), equine chorionic gonadotropin alone (RSEG) and prostaglandin plus equine chorionic gonadotrophin (RSPGEG)



DISCUSSION

This study shows that the administration of equine chorionic gonadotrophin concurrent with prostaglandin treatment improved the oestrus response rates of Red Sokoto goats. This finding is in agreement with the study by Omontese et al. (2013) who reported increased oestrus response rate of 91.6 % when Sahel does were treated with prostaglandin and equine chorionic gonadotrophin. Previous studies using prostaglandins for oestrus synchronization did not include the administration of equine chorionic gonadotrophin in Red Sokoto goats (Kawu, 2011). The increased oestrus response rates recorded in this study may be due to the increase in the availability of gonadotrophins needful to initiate preovulatory events due to its FSH-like activity (Powell et al., 1996; Abecia et al., 2012). The average percentage of does exhibiting oestrus in this study is similar to that reported for Sahel goats (Omontese et al., 2013), Boer goat (Greyling and van Niekerk 1986) and Dairy goats (Fonseca et al., 2005). Slight differences observed may be due to breed of goats, season, hormonal treatment and nutritional status of does (Mani et al., 1992; Fonseca et al., 2005; Omontese et al., 2012; Moradi-Kor and Ziaei 2012).

The interval to onset of oestrus did not differ significantly between groups in this study. This is in agreement with the report of Omontese et al. (2013) in Sahel does. Although there were no significant differences in the interval to onset of oestrus, does in the RSPGEG group had the shortest interval of 29.3 ± 2.1 h. This is less than the 47 ± 3.3 h reported by Bretzlaff et

al. (1983) in does receiving 1.25 mg PGF2a without eCG administration and the 37.4 ± 7.3 h reported by Omontese et al. (2013) in Sahel does treated with prostaglandin and eCG.

Although the duration of induced oestrus period was shorter in the RSPGEG groups than in the RSPG and RSEG groups, these differences were also not statistically significant. The mean duration of oestrus recorded in this study is similar to reports of other researchers in the same breed of goats (Ogunbiyi et al., 1980; Kawu 2011; Omontese et al., 2012). This study revealed a tighter synchrony of oestrus in the does treated with prostaglandins and equine chorionic gonadotrophin. This is similar to the reports of Omontese et al. (2012) in Red Sokoto does treated with a progestagen and equine chorionic gonadotrophin.

Conception rates in this study ranged from 77 % to 80 %. This range is higher than the 28.3 % reported by Dogan et al. (2008) in lactating Turkish Saanen does. Several factors in the synchronization and induction of oestrus have been reported to influence fertility including the detrimental effects of synchronization on sperm transport and sperm survival in the female reproductive tract, differences in the time of occurrence of oestrus and reduction in the lifespan of the ovulatory follicle (Baril et al., 1993; Leboeuf et al., 1998; Whitley and Jackson, 2004).

CONCLUSION

Prostaglandin treatment in combination with equine chorionic gonadotrophin was more effective for oestrus induction in Red Sokoto goats. Based on the results of this experiment, it is recommended that equine chorionic gonadotrophin be included in an oestrus synchronization protocol using prostaglandins so as to improve oestrus response rates and fertility of Red Sokoto does.

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