

CHRONOLOGICAL RELATIONSHIPS BETWEEN ESTRUS ONSET, TIME OF LH SURGE AND OVULATION TIME IN DOES SYNCHRONIZED WITH CHRONOGEST OR CIDR

Ashwag E. M.¹, Mohamed Nour M. S.²

¹University of Albutana, Faculty of Veterinary Medicine, Sudan.

²University of Khartoum, Faculty of Veterinary Medicine, Sudan.
musaadashwag@gmail.com

Abstract- This experiment was conducted to study the chronological relationships between estrus onset, time of LH surge and ovulation time in does synchronized with Chronogest or CIDR. Forty six desert goats were divided into 2 groups (A, and B). Induction of oestrous was carried out using intravaginal sponges impregnated with 40 mg fluorgestone and CIDR for group A and B respectively. At time of sponge or CIDR removal, the animals were injected with 300IU eCG. There was no significant difference in the estrus onset, estrous duration, ovulation time and time of LH surge in does synchronized with either Chronogest or CIDR. Ovulation was detected 54 hours post sponges or CIDR removal. LH surge occurred 28 hours post removal of sponge or CIDR. No significant difference was detected with regard to the time taken from oestrus onset to ovulation time (25.4 and 23.5 hours respectively). Also, there was no significant difference in the time taken from LH surge to ovulation time in does synchronized with Chronogest and CIDR (25.6 and 25.3 hours) respectively. In conclusion, findings observed pertaining to estrous onset, time of ovulation and the time of onset of the LH peak could be of value in timing AI or mating for maximum conception in goat breeding programs when CIDR or sponges were used with 300IU eCG.

Key words: Goats, PMSG, Heat onset, Ovulation time, LH surge

I. INTRODUCTION

Despite major changes in agriculture due to industrial mergers and technological advances, goats are of considerable economic importance particularly for the poor farming system in Africa (McMillin and Brock, 2005). In domestic farm animals, improvement in the reproductive efficiency using modern reproductive techniques such as, Artificial Insemination (A.I.), Embryo Transfer (ET) and the *in vitro* production of embryos depends on a better understanding of the oestrous cycle, estrous synchronization, LH surge and ovulation time that occur during induced and natural oestrous (Chemineau, *et al.*, 1982). The oestrous onset occurred 28- 30 hours after sponges removal in Boer goats (Lehloenya, *et al.*, 2005) and in Hair goats (Karaca, *et al.*, 2010), and 28.87 hours after CIDR removal in the Desert goats (Elmubark, 2010). The Oestrous duration is ranging from 30- 40 hours after sponges removal in Boer goats (Greyling and Vander Nest, 2000), in Dwarf goats (Kausar, *et al.*, 2009) and in South African indigenous goats (Lehloenya, *et al.*, 2005)

The preovulatory LH peak and ovulation time are highly variable between goat breeds (Salma, 1972, Chemineau, *et al.*, 1999). The pre-ovulatory peak in LH concentrations is taken as being indicative of ovulation. Ovulation occurred after 28 h from oestrous onset in

Jakhrana goats and reached to its peak at 36 h post oestrus (Goel and Agrawal, 2003). The interval between the LH peak and ovulation was relatively constant at 24.7 h for Boer goat does (Greyling and Van- Niekerk, 1990). Whereas (Leboeuf, *et al.*, 1993) reported that goats served ovulation time at 16- 24 hrs after LH peak which is reaches after 10 hours from the beginning of oestrous cycle.

For desert goats in Sudan there is lack of information with regard to pattern of sexual activity and seasonality of estrous, pattern of preovulatory LH surge and ovulation time, these parameters are crucial for all programs intended for genetic and reproductive efficiency improvement.

II. MATERIALS and METHODS

Study area: This study was conducted in Nyala, South Darfur state, which is located in the semi arid zone, between latitudes 12.03° N. and longitudes 24.53°E.

Experimental animals:

Forty six apparently healthy desert female goats aged 12-24 months were divided into 2 groups (A, and B).

Treatment protocols:

Induction of oestrous was carried out using two protocols namely, intravaginal sponge impregnated with 40 mg fluorgestone (Chronogest) and Controlled Internal Drug Releasing Device (CIDR) for group A and B respectively. At time of sponge or CIDR removal, the animals were injected with 300IU eCG.

Observations and Time schedule:

Oestrus detection: Observations for estrous to detect the onset and duration was carried out every 4 hours after sponge or CIDR removal using male with abdominal apron, introduced for a period of 10 minutes.

Blood sampling and hormonal analysis: Blood samples for LH assay were collected at 0, 24, 28, 30, and 32 hours post sponge removal. The LH determination in the serum samples of experimental goats were analyzed using LH radioimmuno assay kits IRMA – 2110. Supplied by Department of Isotope, China Institute of Atomic Energy, Beijing.

Ovulation detection: Ovulation time was detected by directly visualizing the ovaries after being exposed through a surgical incision at 46, 48, 50, 52 and 54 hours post sponge removal.

Statistical analysis: Data were analyzed by student's t-test with StatView software (Abacus Concepts, StatView, Abacus Concepts Inc., Berkeley, CA.). Probabilities of < 0.05 were considered to be statistically significant.

III. RESULTS

A. Heat onset:

As shown in Table (1), the mean time interval between sponges or CIDR removal to estrus onset was 28.6 ± 2.3 and 30.8 ± 4.4 respectively, with no significant difference.

B. Heat Duration:

As we could observe in Table (1), no significant difference was detected in estrous duration which was 37 ± 4.9 and 36.9 ± 4.8 hours in does synchronized with chronogest and CIDR respectively.

C. Ovulation time:

Table 2 elaborate the percentage of does ovulated at 48, 50, 52 and 54 hours post sponge or CIDR removal. As shown in the table, 50% of the does were found ovulated at 50-52 hours post sponge or CIDR removal, and all animal examined were found ovulated at 54 hours post removal of either sponge or CIDR. This result shows that all experimental desert goats were found ovulated at 54 hours post sponge or CIDR removal.

D. LH pattern in does synchronized using Chronogest and CIDR:

Figure (1) shows the mean values for LH concentration at 0, 24, 28, 30 and 32 hours post sponge and CIDR removal. As shown LH surge was reached 28 hours post removal.

E. Chronological relationships between oestrous onset, time of LH Surge and Ovulation time:

Chronological relationships between oestrous onset, time of LH Surge and Ovulation time in does synchronized with chronogest and CIDR are shown in Table (3). The result show that the mean time for estrous onset was 0.2 hours after LH surge in goats synchronized with chronogest while those received CIDR treatment showed estrous onset 2 hours after LH surge, no significant difference was detected with regard to estrous onset for both treatments. No significant difference was detected with regard to the time taken from oestrus onset to ovulation in does synchronised with chronogest and CIDR (25.4 and 23.5 hours respectively)

As shown in Table (3), the time taken from LH surge and ovulation was 25.6 and 25.3 hours for chronogest and CIDR respectively, there was no significant difference in the time taken under the two synchronization protocols.

Table: 1 Heat onset and duration in goats synchronized with sponges or CIDR with 300 iu eCG

Treatment Group	No. of Animals	Onset time of estrous (HPR)	Duration of estrous (hrs.)
Chronogest	23	28.6 ± 2.3	37 ± 4.9
CIDR	23	30.8 ± 4.4	36.9 ± 4.8

HPR = hours post removal of chronogest or CIDR

Values are mean \pm SD

Table 2: Percentage of does ovulated at different time after estrus synchronization with Sponge or CIDR

Treatment group	Ovulation check time (HPR)			
	48	50	52	54
Chronogest	33.3%(6)	50%(6)	50%(6)	100%(5)
CIDR	50% (6)	50%(6)	50%(6)	100%(5)

HPR = hours post removal of chronogest or CIDR

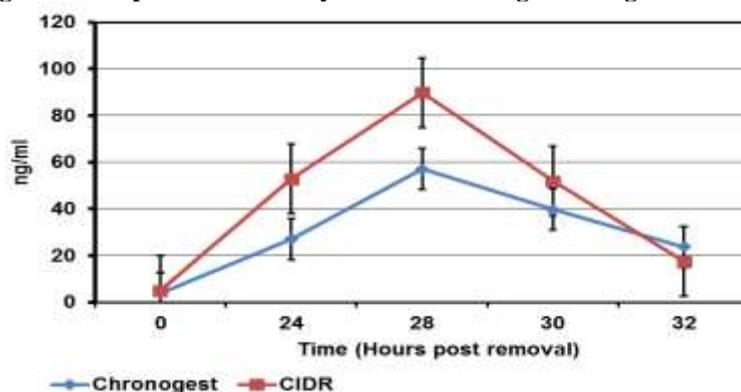
Table 3: Chronological relationships between estrus onset, time of LH surge and ovulation time in does synchronized with chronogest or CIDR

TREATMENT	Time of estrous onset (HPR)	Time of LH surge (HPR)	Time from estrous onset to LH surge (hrs.)	Time from estrous onset to ovulation (hrs.)	Time from LH surge to ovulation (hrs.)
Chronogest	28.6 ± 2.3	28.4 ± 2.2	0.2 ± 3.6	25.4 ± 2.3	25.6 ± 2.1
CIDR	30.5 ± 4.4	28.7 ± 1.5	1.8 ± 4.7	23.5 ± 5.0	25.3 ± 1.4

Values are mean \pm SD

HPR = hours post removal of sponges or CIDR

Figure 1: LH pattern in does synchronized using Chronogest or CIDR



IV. DISCUSSION

As shown in this study there was no significant difference in the estrus onset in does synchronized with either chronogest or CIDR. The time interval of estrous onset after sponge removal in this study accords with those reported by (Karaca, *et al.*, 2010) in Hair goats after short and long progesterone treatment. Similar results were also obtained by (Leboeuf, *et al.*, 2003) in Alpine goats and (Lehloenya, *et al.*, 2005) in South African indigenous goats. The onset of estrous after CIDR removal reported in this study was in agreement with those reported by (Elmubark, 2010) in Desert goats, (Shahneh, *et al.*, 2008) and (Bitaraf, *et al.*, 2007) in Nadoshan goats and (Montlomelo, *et al.*, 2002) in Boer and Indigenous goats. In contrast, (Ali, 2004) and (Kohno, *et al.*, 2005) reported onset at later time in Desert goats and ewes respectively as compared to this study.

There was no significant difference in duration of oestrous after sponge or CIDR removal. The oestrous duration after sponge removal in this study was found to be comparable to those found by (Greyling and Vander Nest, 2000) in Boer goats, (Kausar, *et al.*, 2009) in Dwarf goats and (Lehloenya, *et al.*, 2005) in South African indigenous goats. The duration of estrous after CIDR removal reported in this study is closer to those found by (Elmubark, 2010) in Desert goats, (Abu, *et al.*, 2008) in West African Dwarf Goats and (Bitaraf, *et al.*, 2007) in Nadoshan goats. This result was shorter than that observed by (Mori and Kano, 1984) in Japanese *Shiba* goats.

Knowledge of the time of onset of the LH peak could permit better prediction of time of ovulation; surge of LH triggers the mechanism of ovulation in goats. This estimation of time of ovulation could be of great assistance in timing AI or mating for maximum conception in goat breeding programs. In this study LH surge was reached 28 hours post removal of sponge or CIDR. This accords with those reported by (Gungor, *et al.*, 2007) in Tushin ewes synchronized with sponges and CIDR and (Leboeuf, *et al.*, 2003) in goats synchronized with chronogest. Similar result was also reported earlier, (Ritar, *et al.*, 1984) in goats after intravaginal sponge treatment, (Kohno, *et al.*, 2005) reported 30.3 hours after CIDR removal in ewes, (Iida, *et al.*, 2004) reported 27.0 hours after sponge or CIDR removal in ewe. In contrast, (Quirke, *et al.*, 1981) reported later 37.6 hours after sponge removal in ewe.

With regard to ovulation time in goats studied at 48, 50, 52 and 54 hours post sponge or CIDR removal, all experimental desert goats were found ovulated by 54 hours post sponge or CIDR removal. Most of the ovulations probably appear between 36 and 60 hours after sponge withdrawal in goats treated with PMSG (Cameron, *et al.*, 1988). Ovulation in goats is generally reported as occurring a few hours after the termination of standing oestrous (Riera, 1982).

In this study, the Chronological relationship between estrus onset and time of LH surge in does synchronized with chronogest and CIDR showed that the mean time for LH surge was detected before estrous onset (0.2 and 1.8 respectively), Similar results were obtained by (Kohno, *et al.*, 2005) in Suffolk ewes. In contrast, previous studies by (Greyling and Van- Niekerk, 1990) in Boer goat and (Llewelyn, *et al.*, 1993) in British White goat reported 11.6 h and 12 h after estrous onset using sponges with 500IU

PMSG respectively. The reason for this apparent difference may be species or treatments related.

No significant difference was detected with regard to the time taken from oestrus onset to ovulation in does synchronized with chronogest and CIDR (25.4 and 23.5 hours respectively). Similar results were reported in ewes (Husain, *et al.*, 1998). Relatively wide variations are reported in time of occurrence of ovulation in goats (Riera, 1982, Mori and Kano, 1984, Greyling and Van- Niekerk, 1990). In fallow deer ovulation was reported to occur around 24 h after the onset of oestrus (Asher, *et al.*, 1990). In another study on British White goat ovulation was reported to occur 36-42 h after onset of estrous (Llewelyn, *et al.*, 1993). In Black Bengal does ovulation was reported between 32 and 48 hours after the onset of the oestrous and a range of 24 to 103 hours has been reported (Riera, 1982).

No significant difference was detected with regard to the time taken from LH surge to ovulation in does synchronized with chronogest and CIDR (25.6 and 25.3 hours respectively). This finding is in agreement with previous study (Llewelyn, *et al.*, 1993), who reported that ovulation occurs 20- 26 h after the LH surge in goats. Similar finding was reported in previous studies in goats (Mori and Kano, 1984, Laura, *et al.*, 2007). Another study in goats reported shorter duration (18 hours) (Asher, *et al.*, 1990).

As far as studies on desert goats were concerned, this is the first study that determined the ovulation time in desert goats, and the chronological relationships between estrous onset, LH surge and ovulation time, this findings is of importance to determine AI time.

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