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Research Article

Control of reproductive cycle in goats with Chronogest impregnated intra-vaginal sponges

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ABSTRACT

Treatment of goats with Chronogest intra-vaginal sponges in group I during non-breeding season for a period of 18 days resulted in the exhibition of estrus in all the six treated goats with the onset of estrus within 32.38 ± 0.93 hours after the withdrawal of sponges and the duration of estrus was 48.00 ± 1.15 hours. Out of six goats, two became pregnant, whereas in the control group none of the goats exhibited estrus. In the treatment group all the goats had high progesterone levels during luteal phase that reduced to less than 1.0 ng/ml during estrus followed by rise on day 10 post-breeding, which persisted till day 21 only in two goats that became pregnant. Serum estradiol-17β levels showed significant rise (26.10 ± 1.30 pg/ml) at estrus only in animals that subsequently became pregnant where as in the rest of the animals estradiol-17β level remain around 12.50 ± 8.11 pg/ml or lower throughout the experimental period. In group II, Twelve goats were treated with Chronogest intra-vaginal sponges for 18 days followed by 500 IU PMSG on the day of sponge withdrawal. Six of these received 2.5 ml GnRH and other six received 750 IU of hCG on the day of breeding. Six animals served as control. Two out of five GnRH treated animals and three out of six hCG treated animals became pregnant. In group III,treatment of goats with chronogest intra-vaginal sponges during breeding season for a period of 18 days resulted in the synchronization of estrus in all the six treated goats. Four out of six treated goats became pregnant. All the six goats in control groups exhibited estrus at different time during experimental period.

Key words: Chronogest, reproduction, goats

Estrus control measures are likely to be of good ractical interest as the means of facilitating the plication of artificial insemination in goats. Due to the asonality of reproduction in dairy goats, considerable fficulty may be experienced in goat dairies in intaining an adequate volume of milk supply to the tablished markets during the winter months. Such siderations have been responsible for interest in the duction of estrus in does outside the normal breeding ason. It is now well established that various forms of rmonal treatment or light manipulation can be effective educing such seasonal effects on reproduction in ats. The effectiveness of such measures in practice kely to vary according to age, breed and a variety of vironmental factors (Gordon, 1997). The present dies were therefore designed to evolve a labor nsive and economic method for breeding of goats round the year with an acceptable conception rate.

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MATERIALS AND METHODS

Twenty-four healthy adult female goats were selected as experimental animals and eighteen animals served as control during breeding and non-breeding seasons. The experimental animals were grouped as Group I (breeding season) and Group II (non-breeding season). Group II was further divided into control and three treatment groups (Table 1). Chronogest sponges were inserted into the vagina and kept *in situ* for 18 days On day of the sponge withdrawal (Day-18) 500 IU PMSG was administered intramuscularly in animals during non-breeding season. All the animals were observed for estrus twice daily by teaser buck and those in estrus were bred. During non-breeding season, prior to service, either 750 IU hCG (n=6) or 2.5 ml GnRH (n=6) were injected intramuscularly. The blood samples were collected from these animals on day 0, 1, 10 and

18 after sponge insertion, day of estrus, day 10 post-estrus and day 21 post-estrus and analyzed for serum progesterone, estradiol. Serum progesterone was analyzed by solid phase Radio Immuno Assay (RIA) as per Kubasic *et al.* (1984) using Commercial RIA kits (D.C.P. Los Angeles, USA). Serum estradiol-17 β was estimated by double antibody radio immuno assay as per Robertson (1979), using commercial kit (D.C.P. Los Angeles, USA)

RESULTS AND DISCUSSION

The estrus response, pregnancies and the kids born in the treated goats with chronogest intra-vaginal sponges during breeding and non-breeding seasons are shown in Table 1.

It was observed that the estrus appeared within 24.14 ± 0.05 to 32.38 ± 0.93 hours after the treatment irrespective of the season. Further the expression of estrus was also almost 100 per cent in both, breeding as well as non-breeding seasons. The duration of estrus was about 48 hours, irrespective of the season. These observations indicate that the induction of estrus *per se* is not influenced by the season when the animals are treated with progestogen for a period of 18 days. Similar results were also reported by Corteel (1975); Blichfeldt (1985); Greyling *et al.*(1985); Kiessling *et al.*(1986); Forcanda *et al.*(1990); Goel and Agrawal (1990) and Selvaraju *et al.*(1997).

The most important observation of these studies was that the conception rates which varied significantly within the treatment as well as season. During the non-breeding season, treatment of goats with chronogest intra-vaginal sponges for 18 days and 500 IU of PMSG administered at the time of withdrawal of sponges resulted in 33.33 per cent conception rate when, under similar conditions GnRH administration at the time of breeding, slightly increased to 40.00 percent. However, under the same treatment regimen when 750 IU hCG was administered on the day of breeding , the conception rate increased to 50 percent.

It was interesting to note that during the breeding season when the goats were treated with chronogest intra-vaginal sponges for 18 days the conception rate was 66.66 per cent, in spite of the fact that neither the PMSG was administered at the time of sponge withdr[illegible] nor GnRH or hCG was administered at the time o[illegible] breeding. These results suggest that the effect o[illegible] breeding season on the conception rate is so domi[illegible] during breeding season that the administration of PM[illegible] GnRH or hCG after the sponge withdrawal or at A[illegible] during non-breeding season could not compensat[illegible] for the conception rate during breeding season. In a simil[illegible] study on subcutaneous ear implant during non-bree[illegible] season in buffalo Pant *et al.* (2002) reported that the conception rate at the induced estrus was only 8.3% They attributed low conception rate might be due to nutritional as well as environmental stress. Howe[illegible] supplementing the diet with urea-molasses mineral block (UMMB), although, significantly improved concep[illegible] rate to 13.3%, but still remained much lower than expected during the breeding season. This differe[illegible] could only be attributed to the environmental effect. In the present studies the goats were maintained under the standard feeding and managemental practices throughout the year and hence the difference in the conceptio[illegible] obtained between the breeding and non-breeding season could only be attributed to the seasonal difference. Similar results were also reported by Sivraj (1992); Rosnina *et al.* (1992) and Pierson *et al.* (2001).

The serum progesterone and estradiol levels in the treated goats with chronogest intra-vaginal sponges during breeding and non-breeding seasons are shown in table 2 and 3, respectively.

The serum progesterone levels in the untreated, treated pregnant and treated non-pregnant animals during

Table 1: Effect of treatment on estrous response, pregnancy and kids born during breeding and non-breeding season.

Season	Treatment	Responded to estrus	Pregnant	Kids born
Non-breeding Season	Control	0/12	0/12	-
	Chronogest + PMSG	6/6	2/6	3
	Chronogest + PMSG +GnRH	6/6	2/6	3
	Chronogest + PMSG + HCG	6/6	3/6	4
Breeding Season	Control	6/6	Not Bred	-
	Chronogest	6/6	4/6	5

Table 2: Serum progesterone levels (ng/ml) in chronogest intra-vaginal sponge treated goats.

Season	Treatment	n	PD	Days						
				0	1	10	18	Estrus	10	21
Non-breeding season	Control	12	-	1.11 ± 0.18	1.56 ± 0.15	0.65 ± 0.28	1.12 ± 0.32	1.77 ± 0.32	0.94 ± 0.35	1.03 ± 0.42
	Chronogest + PMSG	6	-Ve (n=4)	5.35 ± 1.89	12.55 ± 9.16	4.8 ± 1.17	14.64 ± 8.68	0.9 ± 0.3	2.77 ± 1.48	3.18 ± 1.48
			+ Ve (n=2)	1.8 ± 0.7	2.7 ± 2.3	7.5 ± 2.5	8.85 ± 0.55	0.2 ± 0	6.6 ± 2.4	19.5 ± 8.52
	Chronogest + PMSG + GnRH	6	-Ve (n=4)	3.07 ± 0.65	17.87 ± 7.06	9.62 ± 3.57	9.45 ± 3.1	1.27 ± 0.38	6.07 ± 1.04	2.52 ± 0.69
			+ Ve (n=2)	1.3 ± 0.2	7.25 ± 4.76	17.5 ± 13.54	20.2 ± 10.83	1.7 ± 0.4	14.5 ± 4.01	23 ± 7.02
	Chronogest + PMSG + HCG	6	-Ve (n=3)	4.63 ± 3.19	14.16 ± 7.99	9.88 ± 6.36	11.33 ± 4.33	0.83 ± 0.33	7.5 ± 3.33	3.36 ± 1.39
			+ Ve (n=3)	2.36 ± 0.41	20.5 ± 5.8	15.83 ± 6.82	19.66 ± 7.97	1.13 ± 0.26	8.76 ± 2.37	28.33 ± 1.66
Breeding season	Control	6	-	1.7 ± 0.31	2.51 ± 0.49	5.06 ± 1.34	7 ± 1.38	2.68 ± 0.48	3.56 ± 1.41	3.13 ± 0.79
	Chronogest	6	-Ve (n=2)	3.9 ± 0.1	6.15 ± 2.35	6.7 ± 5.31	4.7 ± 0.7	1.95 ± 0.65	13 ± 3	3.25 ± 0.25
			+ Ve (n=4)	4.5 ± 0.83	9.05 ± 0.93	4.55 ± 1.57	6.22 ± 0.91	1.57 ± 0.31	14.37 ± 3.35	15.75 ± 3.47

Non-breeding season revealed that before the initiation of treatment, the levels of progesterone were less than 1.0 ng/ml and continued to be lower in the post-treatment period in the untreated animals. In the treated animals the effect of PMSG administered at the time of sponge withdrawal was reflected in a rise in the progesterone levels, which continued to be high in the pregnant animals. Whereas, in non-pregnant animals progesterone levels subsequently reduced to less than 1.0 ng/ml. In those animals which received GnRH or hCG at the time of breeding, showed significant increase in the serum progesterone concentration as a result of GnRH/hCG stimulation. These higher values however, reduced subsequently in the animals that did not conceive, whereas in the pregnant animals the progesterone levels continued to remain high as expected in normal pregnancy.

During the breeding season the initial progesterone levels at the start of experiment itself were around 2.0 ng/ml which increased gradually after the estrus and then continued to remain high in pregnant animals. In non-pregnant animals the progesterone levels increased initially but than subsequently reduced to the basal level. The untreated control animals did not show a rise in the progesterone levels.

The comparison of progesterone levels during breeding and non-breeding season indicated that the overall profiles showed higher levels of serum progesterone during breeding season as compared to the non-breeding season in spite of the progestogen or gonadotrophin treatment. The progesterone levels were

Table 3: Serum estradiol-17 β levels (pg/ml) in chronogest intra-vaginal sponge treated goats

Season	Treatment	n	PD	Days						
				0	1	10	18	Estrus	10	21
Non-breeding season	Control	12	-	8.66 ± 1.51	10.56 ± 2.3	10.6 ± 2.45	7.93 ± 1.25	8.8 ± 2.45	13.46 ± 4.2	10.72 ± 1.59
	Chronogest + PMSG	6	-Ve (n=4)	5 ± 1.4	8 ± 3.03	12.2 ± 4.15	7.1 ± 2.76	12.5 ± 8.11	7.4 ± 2.82	14.8 ± 3.52
			+ Ve (n=2)	7.9 ± 0.3	8.2 ± 6.21	8 ± 3.2	4.6 ± 4.21	26.1 ± 1.3	3.6 ± 3.2	3.4 ± 2.6
	Chronogest + PMSG +GnRH	6	-Ve (n=4)	11.37 ± 5.57	35.75 ± 6.23	16.55 ± 6.33	17.47 ± 4.55	118.75 ± 23.03	15.25 ± 4.47	19.75 ± 13.44
			+ Ve (n=2)	12.5 ± 7.52	20 ± 15.04	22.5 ± 12.33	29 ± 1	105 ± 15.04	26 ± 14.04	58.75 ± 1.25
	Chronogest + PMSG + HCG	6	-Ve (n=3)	22.33 ± 13.99	15.66 ± 6.69	33.5 ± 25.79	28.66 ± 3.18	116.66 ± 13.65	33.33 ± 21.3	29.66 ± 18.14
			+ Ve (n=3)	20.66 ± 11.47	43 ± 17.97	24.16 ± 17.95	31.66 ± 1.66	145 ± 8.67	61.33 ± 30.64	70 ± 15.01
Breeding season	Contrrol	6	-	13.11 ± 3.54	11.93 ± 1.92	7.66 ± 2.78	11.7 ± 3.65	4.93 ± 1.22	5.5 ± 1.83	5.02 ± 1.11
	Chronogest	6	-Ve (n=2)	6.4 ± 2	2 ± 0.4	4 ± 2.4	1.2 ± 0.8	8.5 ± 0.1	4 ± 0	10.4 ± 0
			+ Ve (n=4)	4.8 ± 1.65	2.9 ± 0.86	2.75 ± 0.67	3.38 ± 0.88	7.2 ± 1.65	3.5 ± 0.77	13 ± 0.47

comparable with those reported by Armstrong *et al.*(1983a); Jain and Madan (1986); Bono *et al.*(1983); Mgongo *et al.*(1984); Tanaka *et al.*(1984); Jaiswal (1989); Reddy *et al.*(1989); Jain (1992); Kumar *et al.*(1992); Ryot *et al.*(1992) and Suresh Kumar and Jankiraman (1992).

The serum estradiol-17β levels showed a rise after withdrawal of intra-vaginal sponge during the non-breeding season as well as during breeding season. This could be because of stimulation of ovaries as a result of administration of PMSG at the time of sponge withdrawal as well as due to the progesterone withdrawal effect on the hypothalamo-hypophysio-ovarian axis. During the breeding season also, the estradiol-17β levels showed significant rise after the withdrawal of the intra-vaginal sponge. Since no PMSG was administered at the sponge withdrawal in these animals the rise in estradiol-17β levels could be attributed to the progesterone withdrawal effect. The estradiol-17β levels reported in these study were comparable to those reported by Bono *et al.*(1983); Jain and Madan (1986); Meinecke-tillmann *et al.*(1986); Jaiswal (1989); Kumar *et al.*(1992) and Baru (1997).

In view of regulating the reproductive activity and the supply of the meat round the year, the findings of present study suggest that the conception rate could be improved during the non-breeding season with the hormonal treatment. However, the preferential effect of season would continue to reflect in the conceptic rate.

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