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## Comparison of efficacy in different protocols for induction and synchronization of estrous and pregnancy diagnosis methods in black Bengal does

**S Dash, DN Mohanty and SK Mohapatra**

#### Abstract

Efficacy of estrous synchronization, fertility rate were evaluated in three different groups of healthy breedable Black Bengal does. Group I (n=20) does were synchronized for estrous with intravaginal sponges impregnated with natural progesterone (AVIKESIL-S) + Cloprostenol and group II (n=20) animals injected with long acting progesterone (p-depot) + Cloprostenol. In group I, AVIKESIL-S were left insitu for 15 days where as in animals of group II, received P-Depot intramuscular injections @50mg/doe in 3 days interval for a total of 5 occasions. Both group of does received 125 microgram of cloprostenol on last day of treatment. Group III (n=20) animals were maintained under routine management practices receiving no such treatment were served as control. The percentage of estrous and fertility rate were 90/83 in group I, 80/75 in group II and 55/63.6 in group III. The success rate of pregnancy diagnosis in different methods were found to be 81.25% in abdominal palpation, 76.6% in barium chloride test and 89.5% in serum progesterone concentration method. The results indicate that intra vaginal progesterone sponge and serum progesterone concentration estimations may be used as valuable tools in field conditions for better results in synchronisation and pregnancy diagnosis of does.

**Keywords:** Does, intravaginal sponge, progesterone, conception rate, pregnancy diagnosis

#### Introduction

Synchronization of estrous has enabled dairy cattle farmers to reduce the cost of production by scheduling the future calve birth according to convenience and imparting uniform management to animals. Adaptation of such biotechnology in goat rearing may help the farmers to breed the does on keeping an eye on best marketing opportunity. This will open the window for maximum utilisation of available resource like feed, labour, vaccinations and other management practices for kids. In the contrary, in some countries like Brazil adoption of certain biotechnological protocols for synchronisation had incurred an increase in production cost and limited its use in goat rearing (Machado and Simploacio 1995) [10].

Synchronisation of estrous can be achieved by reducing the duration of luteal phase, by (PGF<sub>2α</sub> or its analogue cloprostenol) or by increasing it with progesterone. During breeding season of doe, synchronisation of estrus has been successful by use of prostaglandin or its analogue (Gordon 1997) [7]. However, the variation in observations among different breeds do not help to draw a conclusive affirmation. Similarly, during long day period use of multiple progesterone injections, control release progesterone devices, intravaginal progesterone sponges (Bearden and Fuquay 2000) [3] have been tried for this purpose with progesterone sponge along with cloprostenol and multiple intramuscular progesterone injections along with cloprostenol. It further assessed the accuracy between abdominal palpation, barium chloride technique and serum progesterone concentration technique of pregnancy diagnosis in does.

#### Material and Methods

The present study was carried out in the Department of Animal Reproduction, Gynaecology and Obstetrics at College of Veterinary Science and Animal Husbandry, O.U.A.T, Bhubaneswar. A total of 60 healthy breedable does within first to third parity mostly thriving by foraging and concentrate were selected randomly for present study. Group I (n=20) animals were synchronized for estrous with intravaginal sponges (AVIKESIL-S) impregnated with natural progesterone and the sponges were left in situ for 15 days. Group II (n=20) goats received long acting progesterone (p-depot) through intramuscular route at dose rate of 50 mg (0.2 ml/doe) at an interval of 3 days for 5 occasions.

Both group of does received 125 microgram of cloprostenol on day of sponge withdrawal and after completion of intramuscular progesterone treatment respectively. Group III (n=20) animals were maintained under routine management practices receiving no such treatment were served as control. Following completion of treatment, pregnancy was assessed 20-35 days after mating in does which did not return to estrous on the basis of non-return to estrous, serum progesterone concentration, barium chloride test and abdominal palpation method. Serum progesterone concentration estimated by direct immuno-enzymatic technique using ELISA kit (Calbiotech, Inc.) in multi label plate reader. The does showing 4 or more ng/ml of progesterone (P<sub>4</sub>) in their blood serum were considered to be pregnant. In the barium chloride test method, 3 ml of freshly collected urine was mixed with equal amount of 1% barium chloride solution. In positive case of pregnancy, there is no coagulation and the solution remains unaltered. Abdominal palpation was done after 75-90 days of mating for confirming the presence of foetus. The does were continuously observed for visual signs of estrous after completion of treatment period.

**Results & Discussion**

Abdominal palpation, barium chloride, serum progesterone profile were commonly used methods of pregnancy diagnosis in livestock. In this study, serum progesterone was come out as most efficient method of pregnancy diagnosis, recording an 89.5 per cent efficacy. The pregnancy diagnosis in goats by determining progesterone concentration in serum by enzyme linked immunoserbent assay (ELISA technique) has been reported by various workers (Bitaraf *et al.* 2008 and Panicker *et al.* 2015) [4, 12]. The accuracy of early pregnancy diagnosis (22 days) was 100 percent and 87.5 percent respectively for non pregnant and pregnant does.

Abdominal palpation technique showed an efficacy of 81.25 percent. Similarly, in Barium chloride test the accuracy was 76.67 percent (Table 1).The accuracy of pregnancy diagnosis by abdominal palpation was reported as 91-92 % (Chauhan and Waziri 1991) [6] and 64 percent (Ahmed *et al.* 2014) [1]. On the contrary, lower efficiency (46.75 %) have been reported by Pal and Ghosh 2002 [11]. The accuracy of abdominal palpation greatly depends on stage of pregnancy, breed of animals, technique employed and skill of the operator. As regards to chemical test, Chakurkar *et al.* 1991 [5] obtained 78.75 % efficacy for barium chloride test. The present observation is in accordance with the findings of the

above workers.

The conception rate following hormonal therapy in goat revealed that 83.30 percent pregnancy was established through intravaginal sponge where 18 does bred naturally (table 2). In intramuscular progesterone injected group and control animals, the conception rate was 75 percent in 16 animals and 63.60 per cent in 11 does those bred naturally. The higher conception rate in group I goats may be attributed towards uniform release of progesterone that might have co-ordinated all the hormonal events necessary for ovulation, fertilization and implantation. Further it has been observed that both estrogen and progesterone concentration in these animals were optimum during day of estrous cycle. It is an established fact that lowers progesterone concentration (less than 1ng/ml) and rise in estrogen is favourable for higher conception rate observed in group I which might be due to the cumulative effect of the drug used. (Panicker *et al.* 2015) [12]. The respective kidding rates were 77. 56 and 54.50 for group I, group II and group III. Reports of earlier workers revealed different conception rate with minimum of 50 per cent (Patil *et al.* 2002) [13] and maximum of 85 per cent (Shiv Kumar 1993) [15] following synchronization with PGF<sub>2α</sub>. Perusal of conception and kidding percent implied that kidding percent was slightly lower compared to actual conception rate established by different methods. However there is a discrepancy between conception rate and actual kidding. This might be due to abortion or erroneous detection of pregnancy. Sometimes positive pregnancy diagnosis both by progesterone assay and abdominal palpation may not be 100 percent accurate in indicating actual pregnancy (Chauhan and Waziri 1991 and Pal and Ghosh 2002) [6, 11]. Progesterone assay for pregnancy diagnosis has certain limitations where non pregnancy can be determined with 100 % accuracy (Arthur *et al.* 1989) [2] but progesterone profile may not be very accurate for diagnosing positive early pregnancy. However, higher level of progesterone may be associated with luteal tissue other than pregnancy (Arthur *et al.* 1989) [2]. As these goats were let loose for browsing to outside, the incidence of abortion might not have been noticed by the owner. Thus the discrepancy between pregnancy and kidding was obvious. The present kidding percent in goats is comparable to the reports of Kusina *et al.* (2000) [9] (83%) in sponge and cloprostenol treated groups and in partial agreement with the findings of Regueiro *et al.* (1999) [14] (64%) and Bitaraf *et al.* (2008) [4] (60 %). The intramuscular application of progesterone yielded 56 % pregnancy which could not be corroborated due to paucity of relevant reports.

**Table 1:** Efficiency of different techniques for pregnancy diagnosis in goats

Methods employed	No of goats	Test shown positive	No of animals actually pregnant (Parturated/Aborted)	Efficiency (percentage)
Abdominal palpation (75-90 days)	45	32	26	81.25
Barium chloride test (25-30 days)	30	28	21	76.67
Serum progesterone concentration (22 days)	45	38	34	89.5

**Table 2:** Conception rate and kidding percentage of goats in response to different hormonal therapies

Parameters/Treatment group	Percentage of animals responded and bred	Conception rate (%)	Kidding percentage
Group-I (n=20)	90 (18)	83.30 (15)	77.00 (14)
Group- II (n=20)	(80) 16	75.0 (12)	56.00 (9)
Group- III (n=20)	55 (11)	63.60 (7)	54.50 (6)
Overall	75 (45)	75.5 (34)	64.40 (29)

Figures in parentheses indicates number of animal



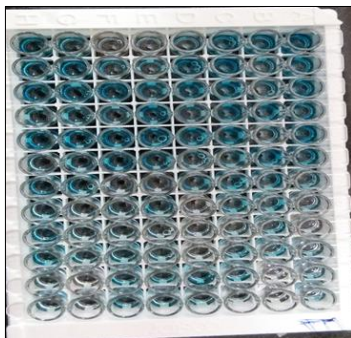
**Fig 1:** Avikasil-S



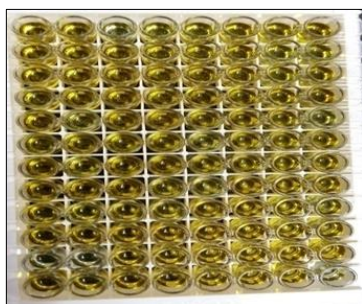
**Fig 2:** Progesterone impregnated sponge with applicator



**Fig 3:** Insertion of I/V sponges in doe



**Fig 4:** Elisa Test for Serum Progesterone



**Fig 5:** ELISA Test for Serum Progesterone

## Conclusion

Thus the present experiment indicated that estimation of serum progesterone at 3<sup>rd</sup> to 4<sup>th</sup> week of mating/service could give a fair indication of conception as compared to other methods. Whereas, barium chloride test can be used as goat side test of pregnancy diagnosis in field conditions. As sustain progesterone releasing devices like intravaginal sponges have better therapeutic efficacy than the parenteral progesterone protocol, thus can be used as economical and superior therapeutics for estrous synchronization, establishment of pregnancy and kidding in small animals like goat.

## Competing interests

The authors declare that they have no competing interests.

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