

EFFICACY OF VARIOUS ESTRUS SYNCHRONIZATION PROTOCOLS ON REPRODUCTIVE PERFORMANCE IN SURTI DOES

H.C. SHARMA*, C.T. KHASATIYA¹, N.F. CHAUDHARI¹ and K.K. TYAGI²

Department of Veterinary Clinical Complex, ¹Department of Veterinary Gynaecology and Obstetrics, Vanbandhu College of Veterinary Science and Animal Husbandry, Navsari Agricultural University, Navsari-396450, India

²Department of Animal Genetics and Breeding, College of Veterinary and Animal Science, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut-250110, India

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ABSTRACT

The present study was conducted with an aim to know the synchronization of estrus in Surti does through buck effect; intra-vaginal progestagen sponges (IVPS) alone or in combination with either prostaglandin F_{2α} (PGF_{2α}) or buck effect. A total of thirty non-pregnant Surti does were divided into five groups (n=6). Does in G1 group were administered IVPS for 11 days. The same treatment was followed in G2 and G3 groups along with the presence of sexually active apronized buck during the treatment period and intramuscular (i/m) injection of PGF_{2α} at sponge removal, respectively. The does in G4 group were exposed to a sexually active apronized buck for 11 days and the G5 group of does were kept as control. The estrus synchronization response was observed 100 per cent from all five groups with non-significant (p>0.05) difference in the mean estrus onset interval between all the groups. The mean duration of estrus was found shorter in G3 group and significant (p<0.05) higher mean duration of estrus was found in control G5 group. The mean number of services per conception did not differ significantly (p>0.05) among the treatment and control groups and the conception rate were obtained 66.67, 66.67, 83.33, 66.67 and 83.33 per cent in G1, G2, G3, G4 and control G5 groups, respectively with the overall conception rate as 73.33 per cent at first service and 83.33 per cent at 3rd cycles from all the groups. It could be concluded that all the protocols are equally efficient in estrus synchronization and advantageous for improving conception rate in Surti does.

Keywords: Buck effect, Conception rate, Estrus synchronization, Intra-vaginal progestagen sponge, PGF_{2α}, Surti does

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Goats are seasonal breeders and declining photoperiod initiates fertile reproductive cycles (Chemineau *et al.*, 2007). In tropical countries like India, goats exhibit estrus throughout year (Mazumdar and Mazumdar, 1983) or are seasonally polyestrous (Mehta and Jankiraman, 1990). Estrus synchronization aids in controlled breeding to synchronize ovulation for kidding throughout year as well as managing lactation efficiently. This is helpful in Indian context where goat husbandry is still reasonably unorganized. Estrus synchronization in goats can be achieved either by reducing luteal phase with PGF_{2α} and its analogues or extending it artificially with exogenous progesterone (Jainudeen *et al.*, 2000). Intra-vaginal sponges are widely used to apply progesterone for synchronizing estrus in small ruminants.

Surti goat, a medium sized dual purpose breed is mostly reared under semi-intensive management in western coastal belt of south Gujarat. To harness opportunities for improving efficiency and addressing some limitations, present study was carried out with objective to study efficacy of various estrus synchronization protocols on reproductive performance in Surti does.

MATERIALS AND METHODS

Thirty non-pregnant Surti does from University Livestock Research Station, irrespective of their parity

*Corresponding author: hcsharma@nau.in

with previous normal kidding were selected at random and kept isolated from the male and reserved for the experiment. Does as well as bucks were fed as per routine feeding system and were maintained on optimum nutritional and hygienic conditions as per standard management practices of the farm. Study was initiated after ascertaining non-pregnant reproductive status of the does by ultrasonography.

Selected goats were evenly divided into five groups *viz.*, treatment G1, G2, G3, G4 and control G5 (n=6). G1 group was administered with IVPS impregnated with 60mg Medroxyprogesterone acetate (MPA) (procured from CIRG, Makhdoom) for 11 days and thereafter sponges were removed on day 11; G2 group was similar to G1 group followed by exposure to sexually active apronized buck day and night for 11 days; G3 group was treated as G1 followed by i/m injection of 125µg PGF_{2α} analogue cloprostenol (Pragma®; Intas Pharmaceuticals) at sponge removal; G4 group was kept with one sexually active apronized buck continuously day and night till 11 days as a teasing period and G5 acted as control group.

Estrus detection was carried out by sexually active apronized buck for twice a day (morning-evening) after 11 days and behavioral estrus signs were monitored visually *i.e.* does showing vigorous wagging of tail, frequent micturition, clustering around buck, mounting behaviour of does, stand to be mounted, vulvar hyperemia and

edema, mucus discharge, acceptance of male by female etc. First acceptance of buck by doe was considered as onset of estrus and duration of estrus was recorded from its onset to cessation and calculated in hours (h). Breeding was done on observed estrus after 11 day onwards by natural service with selected buck according to the breeding policy of the farm. Though, none of the does in G4 and G5 groups were found in estrus during first 11 days, estrus detection and breeding was carried out thereafter.

Pregnancy was confirmed on the basis of non-return rate, serum progesterone level at 45th days post-service followed by abdominal palpation as well as confirmed by kidding event. Percentage of does conceived at induced/natural estrus was considered as first service conception rate while, the does that failed to conceive at induced/natural estrus and returned to estrus were rebred at subsequent (2nd or 3rd) estrus and accordingly conception rate was calculated. Results were obtained and means were compared using one-way ANOVA. Means were separated using Duncan's New Multiple Range Test (DNMRT) and significant differences were declared at 5%.

RESULTS AND DISCUSSIONS

Estrus synchronization response was observed 100 per cent in all the groups (Table 1). Similar to the present study, cent per cent estrus synchronization response was recorded in Saanen goats (Dogan et al., 2004), local goats (Dayanand, 2012), West African Dwarf goats (Oyeyemi et al., 2012), Boer goats (Romano et al., 2016) and Surti does (Chaudhary, 2017). Whereas, little lower as 90% and 80% as well as very low 50% was observed in Markhoz goats (Moeini et al., 2015) and Beetal x Dwarf goats (Kausar et al., 2018) as well as local non-descript goats (Singh et al., 2018), respectively following use of IVPS having different concentration of natural or synthetic progesterone alone or in combination with either buck or PGF_{2α} at sponge removal as well as by buck effect. Mean time estrus onset interval was shorter in G3 and G2 as compared to G1, G4 and G5 groups and results showed non-significant difference among the groups of Surti does (Table 1). Compared to mean time interval for estrus onset in present study, lower value was observed in local goats (Pawshe, 2012) and higher in Surti does (Chaudhary, 2017) and local non-descript goats (Singh et al., 2018).

Mean duration of estrus showed significant ($p < 0.05$) higher duration of estrus in control G5 as compared to G3 (Table 1) and it was shortest in G3 group when compared with other groups. Comparatively shorter time was reported in Beetal x Dwarf goats (Kausar et al., 2018) and

Table 1
Effect of different treatments on synchronization parameters in Surti does (Mean±SEM)

Groups (n=6)	Estrus response (%)	Estrus onset (h)	Estrus duration (h)
G1 (IVPS)	100.00	34.50±5.16 ^a	30.60±0.18 ^{ab}
G2 (IVPS+Buck effect)	100.00	30.67±3.46 ^a	30.33±0.33 ^{ab}
G3 (IVPS+PGF _{2α})	100.00	29.00±1.67 ^a	29.83±0.30 ^b
G4 (Buck effect)	100.00	70.33±40.39 ^a	30.50±0.56 ^{ab}
G5 (Control)	100.00	96.00±45.53 ^a	31.67±0.76 ^a
Overall	100.00	52.10±12.40	30.59±0.22
F value	—	1.18	1.99
P value	—	0.34	0.12

Means bearing common superscripts within a column (between the groups) did not differ significantly ($p > 0.05$).

Surti does (Chaudhary, 2017) whereas longer time was reported in West African Dwarf goats (Oyeyemi et al., 2012) and Boer goats (Romano et al., 2016). Non-significant difference in duration of estrus among treatment groups G1, G2 and G3 suggested equally important role of IVPS alone and in combination with either buck effect or PGF_{2α}. Non-significant difference observed in between G4 (Buck effect) group and each treatment G1, G2 and G3 group might be due to continuous chronic pheromonic effect of buck on hypothalamic gonadotrophins in G4 group inducing increased pituitary FSH & LH that led to early onset of cyclicity. Significant ($p < 0.05$) difference in the mean duration of estrus observed between G3 and G5 might be attributed to sudden removal of progestagen blockage as well as simultaneous luteolytic effect of prostaglandin that led to quick ovarian cyclicity in G3 group. Number of services per conception was non-significant among all groups (Table 2). It was reasonable as most of the does conceived at first and second service. Service period and kidding interval is affected by number of services required for conception and 1.5 services per conception are desirable. However, two services per conception were attained in the present study that was considered appropriate.

Similar to the present study (Table 2), first service conception rate was recorded in Osmanabadi goats (Takle, 2018) and local non-descript goats (Singh et al., 2018). However, lower rate was observed in local goats (Pawshe, 2012) and Saanen goats (Pietroski et al., 2013) while, higher rate in Markhoz goats (Moeini et al., 2015), Beetal x Dwarf goats (Kausar et al., 2018) and Surti does (Chaudhary, 2017). Moreover, a higher first service conception rate observed in control G5 group in the present study might be

Table 2

Effect of different treatments on conception rate in Surti does (Mean±SEM)

Groups (n=6)	Number of Services per conception	Conception rate (%)			
		First service	Second service	Third service	Overall conception rate
G1 (IVPS)	1.67±0.49 ^a	66.67% (4/6)	50.00% (1/2)	0.00% (0/1)	83.33%
G2 (IVPS + Buck effect)	1.17±0.40 ^a	66.67% (4/6)	0.00% (0/2)	50.00% (1/2)	83.33%
G3 (IVPS + PGF _{2α})	1.50±0.50 ^a	83.33% (5/6)	0.00% (0/1)	0.00% (0/1)	83.33%
G4 (Buck effect)	1.00±0.26 ^a	66.67% (4/6)	50.00% (1/2)	0.00% (0/1)	83.33%
G5 (Control)	1.50±0.50 ^a	83.33% (5/6)	0.00% (0/1)	0.00% (0/1)	83.33%
Overall	1.37±0.19	73.33% (22/30)	25.00% (2/8)	20.00% (1/5)	83.33% (25/30)
F value	0.38	—	—	—	—
P value	0.81	—	—	—	—

Means bearing common superscripts within a column (between the groups) did not differ significantly (p>0.05).

attributed to feeding and management practices apart from all kinds of feed and green usually relished by a goat during various seasons.

Compared to the present study, difference in observations of various research workers might be attributed to different drug; dose and regimen apart from different breed of goats, parity, seasons of the year, local feeding and managerial practices and location of study.

Thus, it is concluded that the intra-vaginal MPA sponges alone or in combination with either PGF_{2α} or buck effect as well as buck effect alone are equally efficient in synchronizing estrus and is beneficial for improving conception rate in Surti does.

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