

# Effect of estrus synchronization by progesterone sponge along with PMSG on estrus response and fertility in Nellore Jodipi ewe lambs

B. Hem Kumar<sup>1</sup>, K.V. Bramhaiah<sup>2</sup>, M. Srinivas<sup>3</sup>, B. Ekambaram<sup>4</sup> and N. Dhanalakshmi<sup>5</sup>

Department of Veterinary Gynaecology & Obstetrics, College of Veterinary Science, Tirupati - 517502, AP, India

\*Corresponding author: bramhaiahvet@yahoo.com

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## Abstract

The present study was undertaken to evaluate the effect of synchronization by intra vaginal sponges containing 350 mg of progesterone for 12 days along with either 200 (Group I) or 300 (Group II) IU of PMSG at the time of sponge removal on estrus response and fertility in Nellore Jodipi ewe lambs. The percentage of exhibition of estrus, time of onset of estrus, duration of estrus and intensity of estrus were 80 and 85; 32.00±2.14 and 30.65±1.75 h; 23.19±1.50 and 23.59±1.28 h and 7.38±0.33 and 7.47±0.40 in Group I and II, respectively. All ewe lambs irrespective of estrus symptoms exhibition were inseminated twice intra cervically with fresh diluted semen at 48 and 54 h after sponge removal. The fertility rate based on 25 d non return rate was 75 and 80 % with an overall lambing rate of 50 and 65 % in Group I and II, respectively but the difference between the groups was not significant ( $P \geq 0.05$ ).

**Keywords:** Nellore Jodipi ewe lambs, Progesterone and PMSG, Estrus response, Fertility rate

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Sheep is a seasonal breeder and their reproductive seasonal patterns are affected by latitude, strain, age and nutrition but majority of Indian sheep breeds shows their cyclicity at autumn and spring (Das *et al.*, 2000). Estrus synchronization is one of the valuable and successful managemental tool for enhancement of reproductive performance of small ruminants. Puberty in ewe lambs is achieved when they attain 50-70% of their mature live weight

irrespective of its age. Among estrus synchronization protocols administration of progesterone along with PMSG and Timed artificial insemination (TAI) is one of the efficient ways to manage the reproduction and to plan the breeding programme even during out of breeding season so as to increase the productivity through proper induction of estrus, ovulation and early of onset of estrus. Therefore an attempt was made to understand the estrus response and fertility rate in Nellore Jodipi breed synchronized by different doses of Progesterone and PMSG.

## Materials and Methods

The study was undertaken at Livestock Research Station, Palamaner during December and January, corresponding to out of breeding season according to farm practices. Forty healthy ewe lambs aged between 8-12 months with a weight of around 27-34 kg were selected and randomly divided into two homogenous groups. Each group was synchronized with 350 mg of progesterone impregnated sponges (AVIKESIL) inserted into deep vagina for a period of 12 days (Fig. 1). Then at the time of sponge removal ewe lambs were administered with either 200 or 300 IU of PMSG (FOLLIGON) intramuscularly in Group I and II, respectively. Then estrus response in synchronized ewe lambs in terms of percentage of ewe lambs exhibited the estrus, time of onset of estrus, duration of estrus and estrus intensity was assessed by exposing them to apronized rams with a ratio of 1:8 between Ram : Ewe for about an hour from 24 to 72 h after sponge removal with an interval of 6 h i.e., at 6.00 h, 12.00 noon, 18.00 h and 00.00 h. while the estrus intensity was measured by as per the indications of Homeida *et al.*, (2009) with a score card of degree of expression of restlessness (0-3), standing to be mounted (0-3), vocalization (0-3) and swelling of vulva and mucus discharges (0-3) and these parameters total shall be quantified into weak estrus (0-4), intermediate estrus (5-8) and intense estrus (9-12) of that animal. All the synchronized ewe lambs irrespective of exhibition of estrus were timely inseminated intra cervically twice at 48 and 54 h after sponge removal by using the fertile ram semen that was collected and evaluated for its good quality and diluted with TCFY diluter so as to contain 200 millions of sperms for each AI dose of 0.2 ml (Fig. 2 and 3). Fertility was assessed by 25 d non return rate and lambing rate.

## Results and Discussion

Percentage of ewe lambs exhibited the estrus in Nellore Jodipi ewe lambs synchronized by Progesterone sponge and PMSG was slightly higher {80 (16/20) %} in Group II when compared to Group I ewe lambs {85 (17/20) %} but

difference between the groups was not significant ( $P \geq 0.05$ ) (Table 1). Similar to the present observations Akoz *et al.* (2006) have also noticed higher response. Contrary to present study Kor *et al.* (2012) noticed a significant difference between treatments in the percentage of exhibition of estrus. Slightly higher percentage of estrus response observed in Group II than Group I ewe lambs might be due to administration of higher amount of PMSG and its effect on the development of more number of follicles (Hafez, 2008) and incidences of silent estrus in Group I ewe lambs (Das *et al.*, 1998).

**Table 1: Mean ( $\pm$ SE) estrus response, time of onset, duration and intensity of estrus in Nellore Jodipi ewe lambs synchronized by progesterone intra vaginal sponge for 12 days along with PMSG (200 and 300 IU)**

Characteristics	Progesterone 350 mg + PMSG 200 IU	Progesterone 350 mg + PMSG 300 IU	t - value / Chi-square value
	Mean values ( $\pm$ SE) Value range		
No. of ewe lambs synchronized	20	20	—
Estrus response (%)	80.00 (16/20)	85.00 (17/20)	0.24 <sup>NS</sup>
Onset of estrus (h)	32.00 $\pm$ 2.14 <sup>a</sup>	30.65 $\pm$ 1.75 <sup>a</sup>	0.49 <sup>NS</sup>
Duration of estrus (h)	23.19 $\pm$ 1.50 <sup>a</sup>	23.59 $\pm$ 1.28 <sup>a</sup>	0.20 <sup>NS</sup>
Intensity of estrus	7.38 $\pm$ 0.33 <sup>a</sup>	7.47 $\pm$ 0.40 <sup>a</sup>	0.18 <sup>NS</sup>
Weak estrus (%)	0 (0/16)	0 (0/17)	—
Intermediate estrus (%)	75.00 (12/16)	64.71 (11/17)	—
Intense estrus (%)	25.00 (4/16)	35.29 (06/17)	—
Non return to estrus (%)	75.00 (15/20)	80.00 (16/20)	0.75 <sup>NS</sup>
Overall lambing rate (%)	50.00 (10 / 20) <sup>a</sup>	65.00 (13 / 20) <sup>a</sup>	0.21 <sup>NS</sup>
Lambing rate out of ewe lambs in estrus (%)	50.00 (8/16)	70.59 (12/17)	—
Lambing rate out of ewe lambs in non estrus (%)	50.00 (2/4)	33.33 (1/3)	—

Mean interval from the sponge removal to the onset of estrus observed in the present study was 32.00 $\pm$ 2.14 and 30.65 $\pm$ 1.75 h in Group I and Group II, respectively. The interval from the time of sponge removal to the onset of estrus between Group I and Group II ewe lambs was not significant ( $P \geq 0.05$ ) but the onset of estrus was earlier in Group II when compared to Group I ewe lambs (Table 1). Similar to the present findings PMSG did not show any significant difference among different groups in the study of Nosrati *et*

*al.* (2011) and Zonturlu *et al.* (2011) but Najafi *et al.* (2014) have observed a significant difference. Earlier onset of estrus in Group II ewe lambs might be attributed to the greater effect of progesterone and PMSG in causing more follicular development and difference in the endocrine status of ewe lambs leading to the induction of estrus and proper preovulatory LH surge (Zonturlu *et al.*, 2008).

Mean duration of estrus was  $23.19 \pm 1.50$  and  $23.59 \pm 1.28$  h in Group I and Group II ewe lambs, respectively. The difference in the duration of estrus among the ewe lambs synchronized in Group I and Group II was non-significant ( $P \geq 0.05$ ) (Table 1). Further, slightly longer duration of estrus observed in the present investigation in Group II might be due administration of higher dose of PMSG (Hafez, 2008) and the long biological half life of PMSG leading to a continuous recruitment of antral follicles and development of more follicles (Nasser *et al.*, 2012).

Intensity of estrus was  $7.38 \pm 0.33$  and  $7.47 \pm 0.40$  in Group I and Group II ewe lambs, respectively and its difference between groups was not significant ( $P \geq 0.05$ ) (Table 1). Intensity of estrus exhibition in both the groups noticed in the present study is slightly higher than the findings of Homeida *et al.* (2009) in Naeimi ewes ( $6.00 \pm 0.10$ ). These variations in the intensity of estrus observed might be due to difference in the breed (Karagiannidis *et al.*, 2001), breeding season (Zonturlu *et al.*, 2011), latitude and management, nutrition and age of ewe, season (Zonturlu *et al.*, 2008), gonadotropin dose (Dogan and Nur, 2006) and time of removal of progesterone sponge (Wildeus, 1999).

The fertility rate in Nellore Jodipi ewe lambs was of 75(15/20) and 80(16/20) in Group I and Group II, respectively. While, the fertility rate based on overall lambing rate was 50(10/20) and 65 (13/20) % in Group I and Group II, respectively. The difference in the fertility rate based on 25 d non return rate and lambing rate between Group I and Group II ewe lambs was not significant ( $P \geq 0.05$ ). Further the lambing rates when calculated based on observation of estrus among ewe lambs which have exhibited estrus symptoms did not exhibited the estrus symptoms were 50.00 and 70.59 % and 50.00 and 33.33 % in Group I and Group II, respectively (Table 1). The lambings resulted in ewe lambs which did not exhibit estrus symptoms might be due to incidence of silent estrus and TAI to all ewe lambs irrespective of absence or presence of estrus. This has gained support from the findings of Quispe *et al.* (1994) who have noticed 10 % of ovulations in ewes associated without overt signs of estrus. Silent ovulations may be due to inadequate levels of progesterone (Allison and Robinson, 1970), insufficient gonadotrophic hormone released by

the pituitary, to a poor response by ovary to the exogenous PMSG or variations in hormonal response of the animal (Akusu and Egbunke, 1984).

Present findings recorded in Group I are similar to the findings of Moeini *et al.* (2007) who have recorded 48.9% in Sanjabi ewes while Group II findings are similar to the observations of Ozyurtlu *et al.* (2011) in Awassi ewes (66.6%). Contrary to the present observations higher lambing rates were observed by Abdalla *et al.* (2014) in Barki ewes (100±4.19%) and Taher, (2014) in Iraqi ewes (100%). While, Ustuner *et al.* (2007) have recorded lower lambing rates in Awassi ewes (20%) compared to present study.

The differences in various studies might be due to variation in breed, nutrition, mating season, mating system, age, natural or artificial insemination, type of insemination, time of PMSG administration and PMSG dose (Simonetti *et al.*, 2002), extension of the lifespan of the ovulatory follicle (Vinoles *et al.*, 1999) and difference in the time of occurrence of estrus (Baril *et al.*, 1993). Higher lambing rate observed in the present investigation in Group II ewe lambs compared to Group I ewe lambs might be due to the higher dose of PMSG that would have increased ovulations through production of higher concentration of estradiol and in turn LH surge leading to development of more number of corpora lutea (Yavuzer, 2005) and an increase in progesterone concentrations for early embryo development (Armstrong *et al.*, 1983).

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