Efficacy of estrus synchronization protocols on reproductive performance in goats

E Sunil Anand Kumar, K Ramchandra Reddy, A Gopala Reddy, KBP Raghavavender, D Ashok Kumar and L Ramsingh

Abstract

The present study was conducted to know the efficacy of best estrus synchronization protocols on reproductive performance in goats. Estrus synchronization is valuable reproductive and management technique to breed the goats. Total 100 does were selected in the present study. All the goats were grouped into 5 groups of 20 each. The treatment protocols are control (group – 1), injecting PGF2α with 12 days apart (group-2), vaginal sponges which is treated with progesterone was impregnated into vagina for 12 days (group – 3), vaginal sponge for 12 days with PMSG at the time of removal of sponge (group – 4) and vaginal sponge + PMSG + GnRH at time of breeding (group – 5). All the animals in different groups were analysed for reproductive performance based on Pregnancy rate, Kidding rate, Litter size and Twinning rate. This present study results revealed that, the reproductive performance is high in group – 5 when compared with groups 2 and control.

Keywords: Estrus synchronization, Goats, vaginal sponges, PGF2α, PMSG, GnRH, reproductive performance, pregnancy rate, kidding rate, twinning rate

Introduction

Goat was the first animal to be domesticated by man and continue to hold an important niche particularly in subsistence agriculture in developing countries (Devendra and Solaiman, 2010). India has the largest goat population (18%) in the world. Goat plays an important role in Indian economy (8.5%) to livestock GDP and source of livelihood and employment to millions of rural households (Kumar et al., 2011). Goat will not express clear-cut signs of oestrus, as seen in cattle and are mated arbitrarily. Estrus synchronization is one such valuable reproductive and managemental technique for producers to breed the goats at a definite time and Twinning rate. This present study results revealed that, the reproductive performance is high in group – 5 when compared with groups 2 and control.

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Keywords: Estrus synchronization, Goats, vaginal sponges, PGF2α, PMSG, GnRH, reproductive performance, pregnancy rate, kidding rate, twinning rate
Materials and Methods
The present investigation was undertaken at the Instructional Livestock Farm Complex (ILFC), College of Veterinary Science Rajendranagar, Hyderabad, Livestock Research Institute, Mahbubnagar and in field flocks of Ranga Reddy district in collaboration with the Department of Animal Husbandry, Telangana state. The Does stationed at Livestock Research Institute, Mahbubnagar and field flocks maintained by private farmers were utilized for the study. The Does were housed in thatched roof sheds with mud flooring. The Does were allowed for grazing in the fields and fed on sufficient green fodder and concentrate feed as per the nutritional requirements. Does were vaccinated against ET, PPR, FMD and dewormed prior to the study.

A total of 100 healthy and Does aged about 2 to 5 years (60 days post partum) belonging to different flocks were selected and studied. All the animals were palpated abdominally to diagnose pregnancy and in some animals pregnancy verification was done by ultrasonography using a B-mode ultrasound scanner with 5 to 7.5 MHz convex transducer transabdominally.

A total of 100 does aged between 2 to 5 years will be utilized for the present study. The selected does will be divided into 5 groups in such a manner that each group consists of 20 does. Group 1: comprised of 20 Does that served as untreated controls and termed as “Control” group. These Does were used as untreated controls to enable comparison with the animals treated with PGF2α, impregnated progesterone intra-vaginal sponges, Vaginal sponges with PMSG and Vaginal sponges with PMSG + GnRH.

Group 2:– The Does were administered double PGF 2α injection with an interval of 12 days apart. Group 3:- Goats were implanted with vaginal sponges impregnated with progesterone for 12 days continuously. All the sponges were removed from intra-vaginal after 12 days. Group 4:- Does were implanted with Vaginal sponges for a period of 12 days and at the time of removal of sponges all the Does were given a dose of PMSG (Folligon) @ 300 IU was administered intramuscularly.

Group 5:- Does were implanted with intra-vaginal sponges for 12 days and 300 IU of PMSG was injected intramuscularly at the time of removal of sponges and 10 µg of GnRH (Receptol) at the time of breeding was given.

Of all groups were monitored for the symptoms of estrus by using a teaser buck daily 4 times with an interval of 6 hours for the duration of 30 minutes for five days after withdrawal of intra vaginal progesterone sponges. Estrus signs were recorded by observing the Does behavior to the teaser ram.

The Does were subjected to pregnancy diagnosis by using trans-abdominal approach of real time B-mode ultrasonography @ 5 to 7.5 MHz multifrequency sector array probe was used for scanning of abdomen. The lower abdominal region of the Does was shaved before submitting them for scanning. The scanning procedure was started after day 45 of mating.

The Does were diagnosed as pregnant based on the visualization of an enlarged uterine lumen with amniotic fluid, which appeared as an anechoic area near the anechoic zone of urine filled bladder. Pregnancy was also diagnosed on the basis of visualization of echoic embryo within the amniotic cavity, placentomes and fetal skeleton (Ganaie et al., 2009) [3].

The efficacy of estrus synchronization treatment protocols was measured in terms of pregnancy rate, kidding rate, litter size and twinning rates in pregnant does.

Pregnancy Rate
The pregnancy rate was calculated by the total number of Does kidding divided by the total number of Does mated multiplied by hundred as per the method described by M.G. Sahare et al. (2009). The pregnancy rate was expressed in terms of per cent.

Kidding Rate
The lambing rate was calculated by the total number of kids born divided by total number of Does mated multiplied by hundred as per the method adopted by Zeleke et al. (2005). The kidding rate was expressed in terms of per cent.

Litter Size
The litter size was calculated by total number of kids born divided by the total number of Does kidding as per method adopted by Zeleke et al. (2005).

Twinning Rate
The twinning rate was calculated by the total number of twin kids divided by the total number of kids multiplied by hundred as per method described by M.G. Sahare et al. (2009). The twinning rate was expressed in terms of per cent.

Statistical Analysis: The data collected was subjected to suitable statistical procedures as described by Snedecor and Cochran (1994).

Results & Discussion
The results of the present study on various estrus synchronization protocols in different groups of local does are presented in this section. Comparison was made between the groups on different days of treatment. The efficacy of protocol was expressed in terms of pregnancy rate, kidding rate, Litter size and multiple births and presented in table.

Pregnancy Rate
The pregnancy rate (%) was 33.33 in the control group 1 and the group 2 does treated with double PGF2α in 12 days shown the pregnancy rate as 64.28. In group 3 does impregnated with intra vaginal sponges for 12 days, the pregnancy rate was 75.00. The pregnancy rate was 81.25 in the local does of group 4 does impregnated with vaginal sponges for 12 days and 300 IU of PMSG at the time of removal of sponges and the group 5 does impregnated with vaginal sponges for 12 days + 300 IU of PMSG at the time of removal of sponges + GnRH 10µg at the time of breeding showed the pregnancy rate as 84.21 (Table 1 & Fig. 1). The pregnancy rates were higher in does treated with different estrus synchronization protocols as compared to control group 1.

Kidding Rate
The kidding rate (%) was 33.33 in control group 1 and in the group 2 does treated with double PGF2α in 12 days apart, the kidding rate was 78.57. In group 3 does impregnated with intra vaginal sponges for 12 days, the kidding rate was 91.66. The kidding rate was 106.25 in the group 4 does that were impregnated with vaginal sponges for 12 days and 300 IU of PMSG at the time of removal of sponges and the group 5 does impregnated with vaginal sponges for 12 days + 300 IU of PMSG at the time of removal of sponges + GnRH 10µg at the time of breeding showed the kidding rate as 126.31 (Table 1).
The kidding rates were higher in does treated with different estrus synchronization protocols as compared to control group 1.

**Litter Size**

The litter size was 1.00 in control group and in group 2, where the local does treated with double PGF₂α in 12 days apart was shown the litter size was 1.22. In local does of group 3 impregnated with intra vaginal sponges for 12 days, the litter size was 1.22. The litter size was 1.30 in the group 4 does impregnated with vaginal sponges for 12 days and 300 IU of PMSG at the time of removal of sponges and the group 5 does that were impregnated with vaginal sponges for 12 days + 300 IU of PMSG at the time of breeding showed the litter size as 1.50 (Tab 1 & Fig. 3). The litter size was higher in does treated with different estrus synchronization protocols when compared to control group 1.

**Twinning Rate**

The twinning rate per cent (%) of does in control was 0.00 and the per cent of twinning rate in group 2, where the local does treated with double PGF₂α in 12 days apart, was 18.18. Twinning rate of does in group 3 was 18.18, in which the local does were impregnated with vaginal sponge for 12 days continuously. In group 4 does impregnated with vaginal sponges for 12 days and 300 IU of PMSG at the time of removal of sponges the twinning rate was 23.52, while it was 33.33 in group 5 does that were impregnated with vaginal sponges for 12 days + 300 IU of PMSG at the time of removal of sponges + GnRH 10µg at the time of breeding (Tab. 1 & Fig. 4).

<table>
<thead>
<tr>
<th>Group No</th>
<th>Treatment Protocols</th>
<th>Does kidding / mated</th>
<th>Pregnancy Rate (%)</th>
<th>Kids born / Does mated</th>
<th>Kidding Rate (%)</th>
<th>Kids born / Does kidding</th>
<th>Litter Size</th>
<th>Twin kids / no. of kids</th>
<th>Twinning Rate (%)</th>
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<td>Control</td>
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<td>2/6</td>
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<td>2/2</td>
<td>1.00</td>
<td>0/2</td>
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<td>11/14</td>
<td>78.57</td>
<td>11/9</td>
<td>1.22</td>
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<td>18.18</td>
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<td>Vaginal Sponge</td>
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<td>75.00</td>
<td>11/12</td>
<td>91.66</td>
<td>11/9</td>
<td>1.22</td>
<td>2/11</td>
<td>18.18</td>
</tr>
<tr>
<td>4</td>
<td>Vaginal sponge + PMSG</td>
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<td>81.25</td>
<td>17/16</td>
<td>106.25</td>
<td>17/13</td>
<td>1.30</td>
<td>4/17</td>
<td>23.52</td>
</tr>
<tr>
<td>5</td>
<td>Vaginal sponge + PMSG + GnRH</td>
<td>16/19</td>
<td>84.21</td>
<td>24/19</td>
<td>126.31</td>
<td>24/16</td>
<td>1.50</td>
<td>8/24</td>
<td>33.33</td>
</tr>
</tbody>
</table>

Table 1: Pregnancy rate, Kidding rate, Litter size and Twinning rate between groups and days of treatment in Synchronized Local Does

Fig 1: Pregnancy Rate (%) in Does synchronized with different treatments

Fig 2: Kidding Rate (%) in Does synchronized with different treatments

Fig 3: Litter size of Does synchronized with different treatments

Fig 4: Twinning Rate (%) of Does synchronized with different treatments
References


