Induction of estrus by laser puncture exposure in Etawah Crossbred Does with the anestrus post-partum problems at different parities

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Abstract. This study was conducted to induce estrus by laser puncture exposure in anestrus post-partum Etawah Crossbred goats, at different stages of parity. In total 38 does at parity 1 to 6 were treated by laser puncture in the reproductive acupuncture spots. The exposure of laser puncture was 10 sec per spot, for three consecutive days, on 17 reproductive acupuncture spots located at 1.5 cm lateral columna and lumbal vertebrae L1 to L7 and at vulva. Estrus was observed from day 1 until 11 days post exposure. Variable observed were exhibition, length and onset of estrus. As the result 76.32% of does were exhibit estrus. According to parity, percentage of estrus does was increase form parity 1 to 3, and slightly decrease form parity 4 to 6. Onset estrus was around 2 – 6 h in parity 2 to 3, while longer estrus was found in parity 4 to 6 around 6 – 13. Estrus length in parity 1 and 2 was 55 h, and it is shorter compared to parity 3 to 6 (>80 h). It was concluded that laser puncture able to induce estrus and according to parity, acceptable estrus was showed at parity 1 to 3 than 4 to 6.

1. Introduction
The interval period between parturition and the resumption of reproductive activity in dairy goats is one of important factors that determine the frequency of kidding and the number of kids can be produced by female animal overall lifetime productivity [1]. In Indonesia, almost goats overall in the country are kept under traditional rearing and management with poor nutritional feeds, high micro environmental temperature and humidity causing the body growth is slow and has low condition score. The limited quality and quantity of feed consumed by the does influence on the reproductive activity in the young and mature does, while the nutrition is the main factor regulating the normal reproductive hormone in the body [2]. The enough feed supply during pregnancy and especially before giving birth is an important factor to ensure and maintain the normal live body weight and reproductive hormonal status during kidding and lactating period in does. [2] reported that nutrition of pregnant dairy goat causes the late cyclicity after give birth. This condition was improved by giving additional protein in the feed (20% crude protein) and TDN 65% to 85%. The interval days of uterine involution and first estrus post partum were shorter when the energy in diets was increased indicating that the poor body condition of dairy goat during post partum affect directly on the return time of normal reproductive activity. The effect of body condition in dairy goats during before and after partum on the milk production was also reported having positive correlation [3]. The does with body condition score (BCS) ranging 2 to 4 showed to increase significant increase of milk production and milk protein, but
not significant for milk fat. BCS has also closed correlation to the reproductive performances as like litter size, birth weight, weaning weight and normal estrus cyclicity in ewes where the medium BCS gave more insurance for better reproductive parameters than lower and higher BCS [4].

Postpartum period is critical time for recover normal reproduction activity and determine the effective the does production or not. Anestrus post partum symptom, a condition where the animal do not show return showing estrus more than 60 days after give a birth, is one of the big and serious problem in dairy farm management especially in Indonesia due to animals do not receive adequate nutrition during pregnant, kidding and post partum. This condition causes the low BCS, unbalanced or low level circulated reproductive hormone and associate with low emergence rate of 1st follicle and low activity of corpora lutea activity, if any [2]. [5] reported that injection of gonadotropin hormone in anestrus goats can increase the progesterone level as a consequence of more active functional corpora lutea.

Besides the hormonal treatments, the anestrus postpartum can successfully be induced by laser puncture at the reproductive accupoints for exhibiting estrus in goats and cows with the estrus rate 45 – 100% according to exposure treatments [6–8]. Parities and age have close correlation in female, and this this factor are related to the reproductive performance in human and animals [9–11]. In Arsi-Bale goats the highest estrus and reproduction performances were shown at parity two, and then decreased slightly from parity three until 6 [9]. Similar result was reported in Gaddi goats in Western Himalayan Ranges, but after parity three no significant decrease until parity six [11]. This study aimed to evaluate the effect of laser puncture exposure at the 17-reproductive points on the estrus characteristics of Etawah Crossbred does at different parities.

2. Materials and methods

2.1. Animal materials
The materials used in this study were 38 nully- and parous females Etawah Crossbred goats having anestrus postpartum symptom at the parities from 1 to 6. The does were kept in pen stall at Teaching Farm Center, Faculty of Animal Science, University of Brawijaya, Sumbersekar, Dau, Malang. The animals were fed with suboptimal standard feed consisting 3-5 kg fresh forages a/animal/day and 18% CP-concentrate consisting rice bran, soy bean meal and pollard of 0.5 kg/animal/day. Drinking water was served ad libitum.

2.2. Laser puncture treatments
The stimulation of estrus by laser puncture, exposure of laser was applied at 17 reproductive accupoints [7]. Acupuncture points was determined before the laser puncture exposure was done using electric accupoint detector to ensure the laser puncture can be exposed at the right point. To determine accurate accupoint locations at the skin surface, the accupoint detector with low electric voltage was attached on the skin according the 17 reproductive accupoints at the around 1.5 cm lateral position of columna vertebralis and lumbal. Acupuncture points can be successfully detected in all does with different responses that we considered that it is influenced by different body condition of animal. The detected location of points was than marked with ink. The estrus of animal was induced by laser pucture at 17 reproductive accupoints during 3 consecutive days at the intervals of 24 hours, 10 sec per spot. The laser beam used was the low-power of 10mW / 10Hz and 633nm wavelengths. The estrus of animal was detected by male teaser controlled by technician to avoid natural mating from day 1 of first day laser puncture exposure until day 11. The estrus was considered as estrus when the female stands for male mounting.

2.3. Data analysis
Data of the number of estrus, onset of estrus and duration of estrus were descriptively expressed in each parity with percentage, mean and standard deviation.
3. Results and discussions

Table 1 showed that the number of does showing estrus following laser puncture exposure increased gradually from parity 2 to 3, and decreased from parity 4 until parity 6. Except the does in nulliparous, Parity 1 (n=3) that all (100%) exhibited estrus, the highest number of does showing estrus was observed at parity 3 (91%). On the other hand, the optimum onset of estrus following laser induction and duration of estrus were obtained at parity 1 and 2.

Table 1. Effect on laser puncture treatment on number of animal in estrus, onset of estrus and duration of estrus in Etawah Crossbred does with the anestrus postpartum symptom.

| Parity | Number of does | Number does in estrus, n (%) | Onset of estrus after laser induction (days) | Length of estrus (hours) |
|--------|----------------|-----------------------------|---------------------------------------------|--------------------------|
| 1      | 3              | 3 (100)                     | 2.00 ± 0.00                                 | 54.00 ± 0.00             |
| 2      | 12             | 8 (67)                      | 3.38 ± 2.72                                 | 57.75 ± 30.58            |
| 3      | 11             | 10 (91)                     | 6.60 ± 4.30                                 | 82.80 ± 74.18            |
| 4      | 4              | 3 (75)                      | 13.33 ± 12.86                               | 84.00 ± 42.00            |
| 5      | 4              | 3 (75)                      | 11.67 ± 7.51                                | 62.00 ± 18.33            |
| 6      | 4              | 2 (50)                      | 6.00 ± 5.66                                 | 42.00 ± 0.00             |

The longest interval between laser induction and onset of estrus and the longest estrus duration were observed at the parity 4. In ewes, the estrus response to laser puncture treatment reached 100% when induced to luteal phase ewes, and 95% when induced to unknown estrous cycle with the means of estrus duration of 27 hours [7]. The different results might be caused by different body condition of animal, where in this study used anestrus postpartum-poor body condition of does, and the other reason was might be to the different species that possible to give different response to laser induction. In this study showed that the age or the parity of does affected the response rate to the laser induction and resulting different estrus characteristics indicating that the optimum reproductive maturity reached at parity 1–3. This result was compromised to the results of [12] that nulliparous does were half number become pregnant than were multiparous does. The does at parity 2 – 5 showed 1.8 times more to became pregnant compared to the other all parities. They showed also that does in parity groups 2-5 were half as likely to abort as were primiparous or older goats. The oldest goats had 60% higher possibility of aborting compared with the youngest does.

Figure 1. Percentage of animals showing estrus (left) and onset of estrus (right) of does following laser puncture treatment according to the parity.

The ovarian responses to the estrus induction showed generally unpredictable results either in number of animals showing estrus, onset of estrus or duration of estrus. Figure 1 showed that irregular pattern of estrus response to the treatment (Fig 1 left) from parity 1 to 6, although the it was could be predicted that parity 3 was the best response. The same thing to those was observed in the onset of
estrus, where inconsistent difference time between parity was observed. The similar result was reported by [13] in Persian does synchronized with combinations of progestogen in different forms and PGF2α showing the large range of the estrus onset from 24 to 72 hours following the end of treatment. It seems that the estrus response to hormonal treatment is stronger than those to the laser puncture induction.

4. Conclusions
The anestrus postpartum of poor body condition of Etawah Crossbred does could be induced to exhibit estrus by laser puncture exposure with the vary estrus response, onset of estrus and duration of estrus according to the parity stages. The better estrus response to laser exposure was at parity 1 to 3. There was long time range of estrus onset in different parities from day 2 until day 13 following the laser exposure.

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