Comparison of Success Rate of Estrus and Pregnancy between Laser Puncture and Intra Vaginal Progesterone Sponge in Bali Cattle

R. Tatang Santanu Adikara[1], Herry Agoes Hermadi[2], Warsito Sunaryo Hadi[3], Lita Rakhma Yustinasari[4]

[1]Professor, Department of Veterinary Anatomy, [2]Professor, Department of Reproduction, [3]Lecturer, Department of Animal Nutrition,[4]Lecturer, Department of Veterinary Anatomy, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia.

Abstract

The purpose of this study was to find a method of determining laser models and intra vaginal progesterone sponge in Bali Cattle. An assessment was carried out at Sapi Loka Grati, Pasuruan, Indonesia. The parameters observed included the symptoms of estrus, response of estrus, and the level of pregnancy. Twenty Balinese cows were divided at random in two groups. P1 treated with laser puncture at a certain point and P2 treated with 1.5 g of progesterone + 10 mg of estradiol benzoate intra vaginal sponge. The diagnosis of subsequent pregnancies was done by ultrasonographic examination on day 40th after artificial insemination (AI). The laser used in this study was a soft laser with power supply specifications as follows: 50 Hz, 220 Volts, 50 Watts, ranging from 0.2 Joules to 0.5 Joules. These lasers include semiconductor lasers and laser probes. Three acupuncture points were used (GV 4, BL-22, and GV-2). Furthermore, the intra vaginal progesterone sponge used was made from silicone plastic similar to the drugs containing medroxyprogesterone acetate. Data testing was done by using the T-test. Results demonstrated that the P1 responses of estrus appeared on day 3rd, while P2 on day 9th. There was no significant difference (p >0.05) in the accumulation of estrus and pregnancy. In conclusion, estrus synchronization and pregnancy rate could be efficiently achieved in Bali cattle using either laser puncture or intra vaginal progesterone sponge. However, laser puncture treatment induced more spread estrus with higher pregnancy rate.

Keywords: *Bali cattle, estrus synchronization, intra vaginal progesterone, laser puncture, pregnancy.*

Introduction

Bali cattle is one of the beef-producing livestock in Indonesia, but domestic Balinese beef production has not been able to cover the needs because of their population and low productivity levels. Various methods have been taken so that livestock productivity is maximized, including through improved management and quality of feed or by utilizing technology. The low population of Bali cattle is partly due the low level of reproduction[1]. For better reproductivity, estrus induction is one of important ways to be performed. Estrus induction is usually performed with hormonal method, such as application of PGF2α, but the disadvantage is relatively expensive[2].

Laser puncture technology has been proven to induce estrus with variable success in goats[2,3], sheep[4], and cows[5]. Irradiation of acupoints by means of low-level laser provides a relatively safe, noninvasive and efficient way of stimulation of acupoints[6]. Response and signs of estrus could apparently be improved after conducting a laser puncture procedure, so that could increase a pregnancy rate[7,8]. The application of laser puncture to Bali cows resulted in a response to estrus 90%, and from insemination, a pregnancy rate of 80% was obtained. The occurrence of conception in marriage indicates that estrus that occurs with laser puncture stimulation is followed by ovulation[3]. In this study, laser

Corresponding author:
Herry Agoes Hermadi
Email: herrypro59@yahoo.com

puncture has been reported to comprise a success rate of estrus and pregnancy with progesterone intra vaginal sponge in Bali cattle.

Materials and Methods

A total of 20 non-pregnancy Bali cows aged 2-3 years old, from cattle at Grati, Pasuruan, Indonesia were used in this study. Their body was scored at least 2 from 5 grades. All of the cows have been confirmed to have a normal estrus cycle that randomly divided into three groups. P1 was given a laser puncture and P2 was given progesterone (1.5 g) and estradiol benzoate (10 g) intra vaginal sponge.

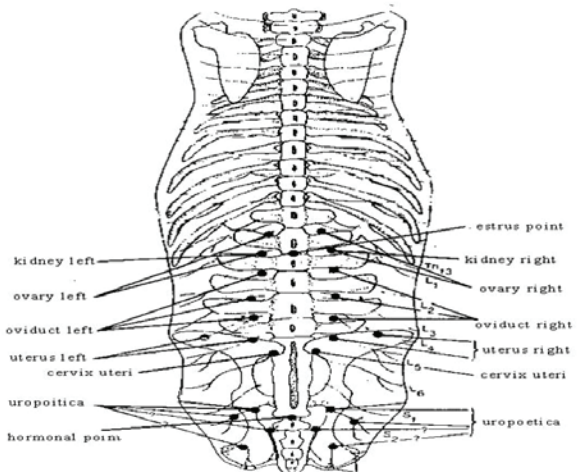

Figure 1. Accupuncture points related to reproduction[9].

P1 was treated using low-level laser puncture. The laser used in this study was a soft laser include semiconductor laser using power supply with specifications: 50 Hz; electricity of 220 Volts, 50 Watts output power, and laser probes. The laser puncture stimulation was applied on three reproductive acupoints (Figure 1): (a) GV 4, in the depression along the dorsal midline at the intervertebral space between L2 and L3 (for remove Qi/blood stagnation); (b) BL-22, at the first lumbar intervertebral space (L1-L2); and (c) GV-2, on the midline, in a depression at the first coccygeal vertebral space (C1-C2)[9]. The laser was applied to each acupoint 0.2 to 0.5 Joules performed sequentially for 3 min/day for 3 days. Observation the sign of estrus was carried out on day 3 and 4.

P2 was treated using intra vaginal sponge with plastic design (Pro Sponge progesterone) soft release containing progesterone for estrus induction in cattle. It was a large sponge capsule prototype and has a T-shaped plastic on top of it with nylon thread as a puller during extraction (length of ±15 cm and a width of 8 cm) on the caudal part. PGF2α recommended for use after 7 days stored and removed from the vagina on day 7 to ensure synchronized estrus[10]. The occurrence of estrus was observed and the animals which exhibited estrus were inseminated artificially with fresh sperm and the presence of pregnancy was noted. Examination to determine pregnancy was evaluated 40 days after artificial insemination (AI) using ultrasonographic examination. The data presented as means standard error of the mean and were compared using the Student's T-Test. They were considered to be significantly different if $p < 0.05$.

Results

Sign of Estrus

Physically, the occurrence of estrus was almost similar to the sign of estrus caused by natural mating, characterized by swelling of the vulva and reddish with transparent mucus accompanied by the appearance of the Bartholin gland. However, the color of vulva is redder with more transparent mucus than normal estrus that makes easier to detect.

Estrus responses

There was no significant difference ($p > 0.05$) among treatment groups in the sign of estrus after treatment (Table I). All of the cows (100%) of the laser puncture and 90% of sponge intra vaginal progesterone had exhibited estrus. The interval of estrus was 3-6 days for laser puncture-treated cows and 9-10 days for progesterone intra vaginal sponge-treated cows, respectively.

Research result showed that from 10 cows treated by laser puncture which had estrus, there were 5 cows (50%) estrus on day 3; 3 cows (30%) estrus on day 4 and 2 others (20%) estrus on day 6. Whereas, from 9 cows treated by progesterone intra vaginal sponge which had estrus, there were 7 cows estrus on day 9, while 2 cows estrus on day 10. Laser puncture technology required interval 3 to 6 days after laser treatment and the most was 3 days. It means that laser puncture technology for estrus synchronization provides faster response compare to progesterone intra vaginal sponge.

The synchrony response of the cows in the present study was similar to that reported by others. Adikara (1995) obtained estrus success rate of 95% for treatment without seeing the estrus phase and 100% for treatment in the luteal phase. After the last 24 hours of shooting laser puncture, symptoms of estrus and hormonal examination showed an increase in reproductive hormones[11]. Herdis (2011) demonstrated 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[4].

Pregnancy Rate

The results of the study did not show any significant differences with T-test (p >0.05) in pregnancy rate (Table 1). By 40 days after artificial insemination, 100% and 90% of laser puncture-treated cows and progesterone intra vaginal sponge-treated cows were pregnant. These results indicate the pregnancy rate of estrus cows was very high, referring to the minimum standard of artificial insemination success according to the Directorate General of Animal Husbandry for an area in cattle is 55%[12,13]. Ultrasonographic examination appearing hyperechogenic embryo and hypoechogenic uterin horn (Figure 2).

Table 1. Different effect on laser puncture and sponge intra vaginal progesterone treatment on the number of animal estrus, interval of estrus, and pregnancy rate.

Treatment group	Number of cows	Percentages of estrus response	Interval of estrus after treatment (days)	% Pregnancy based on estrus response
Laserpuncture	10	10 (100%)	3.7±0.5a	10 (100%)
Sponge-progesterone	10	9 (90%)	9.2±1.2b	9 (90%)

[a,b]Different superscripts at the same column indicate significant differences (p <0.05)

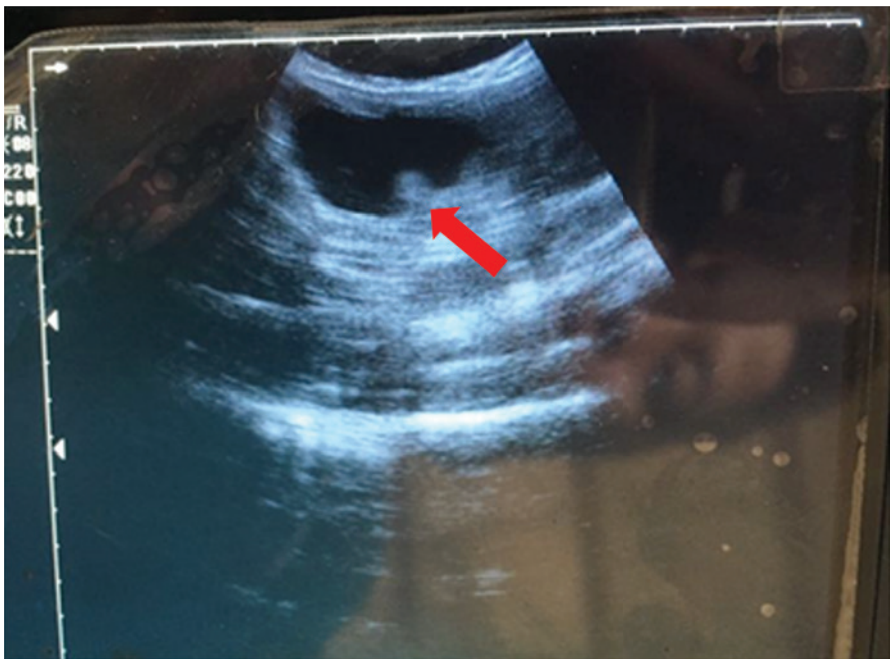

Figure 2. Diagnosis of pregnancy appears on ultrasonographic examination showed hyperechogenic embryo and hypoechogenic uterine horn

Discussion

The mechanism of stimulation of acupuncture points to the target organ is closely related to the acupuncture point as an active electric cell and acupuncture meridian. According to Adikara (2001), the framework of acupuncture points and acupuncture meridians is in accordance with the TAO philosophy which reveals the balance between living things and their environment. The theory that supports this is the existence of relationships between cells through cell bridges (intercellular bridges) that can be passed by material/protein with a certain molecular weight. Because the relationship is initiated by active cells, if there is a stimulus will cause a reaction of the emergence of cell activity in the form: changes in polarization, electrical charge, the occurrence of influx ions that stimulate rRNA and activation of mRNA to perform protein synthesis. The stimulus will be specifically communicated by other similar cells (active nature) so that it is an activity between the extra and intra-cells to the organ. Related organs will be stimulated to carry out a dynamic and physiological function with optimal capacity. The transfer of stimuli and matter through these specific cellular pathways is a dynamic energy change that leads to balance for the creature's body[14].

The accuracy of the occurrence of estrus and pregnancy cannot be separated from the expertise of each researcher. Laser energy that falls on living tissue will give a biological reaction that depends on the type of tissue, the condition of the tissue and the amount of laser energy, it can provide destructive, inhibitory or stimulating effects[15]. Meanwhile, the energy generated by He-Ne soft laser or low-level laser is a biostimulator effect that aims to stimulate estrus in livestock so that their reproductive functions can take place properly and normally. By using estrus synchronization (either laser puncture or sponge intravaginal progesterone) the cows will be bred within a short period of time, and the subsequent lambing will also take place over a short time period. This will allow producers to plan for labor input and feed resources[16]. Another benefit of estrus synchronization is that it will allow producers to utilize other advanced breeding techniques such as artificial insemination. In cattle, estrus synchronization and artificial insemination (AI) can be used to maximize the reproductive potential of cows by incorporating superior genetics into their operations[17,18].

Conclusion

Based on the results, Bali cows can be synchronized using either of the two methods described, with no significant differences in the success rate of estrus and pregnancy rate. However, cows synchronized with laser puncture had a shorter interval to estrus than cows synchronized with sponge intravaginal progesterone.

Conflict of Interest: The author declare that they have no conflict of interest.

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