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## Relationship between day 12 post-AI plasma progesterone concentrations with pregnancy outcome in indigenous cow

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### Abstract

In present study comparative analysis of plasma progesterone concentration on day 12 post-AI in pregnant and non-pregnant indigenous cows was done. Estrus synchronization was done in total 200 cows and blood samples were collected on day 12 post-AI. Pregnancy diagnosis was done on day 45 post-AI and in subset of 100 cows (50 pregnant and 50 non pregnant) plasma progesterone was measured through ELISA kit. Higher plasma progesterone concentration (ng/ml) was found in pregnant cows as compared to non-pregnant.

**Keywords:** Indigenous cow, estradiol, AI, pregnancy outcome

### 1. Introduction

India is home to be 142.11 million humped cattle (*Bos indicus*) and there are so far 43 registered native cattle breeds in India broadly classified into dairy, draft and dual purpose breed depending upon their utility either in dairying or in agriculture work (Livestock census, 2019) [1]. The indigenous breeds of cattle possess ability to sustain harsh climatic condition and can sustain milk production even on very low nutrient intake (Sodhi *et al.*, 2013) [8].

Progesterone is a 19-C steroid hormone produced by the CL synthesized from cholesterol. It is essential for maintenance and recognition of pregnancy. Plasma progesterone concentrations directly reflect the functional status of CL. Low plasma progesterone during the early luteal phase is associated with poor embryo survival (Geisser *et al.*, 1992) [2]. Progesterone is required not only to maintain a suitable uterine environment but also to facilitate the elongation of conceptus and, consequently, the secretion of adequate interferon-tau which is main antileptolytic mechanism exhibited by conceptus. Thus, present study was designed to establish relationship between plasma progesterone concentration on day 12 post AI and pregnancy outcomes at 45 days post AI.

### 2. Material and Method

The study was conducted on 200 indigenous cattle maintained at farms of Hisar and Jhajjar districts of Haryana during months of December to April, 2021. The experimental cows were kept in loose housing system under group management practice with provision of fresh drinking water and shelter was also provided to protect animals from climatic adversities. A total 200 cows were synchronized with Ovsynch based synchronization strategy and fixed time artificial insemination was performed 18-24 hours after last GnRH injection of Ovsynch protocol. Pregnancy diagnosis was done 45 days post-AI and 50 pregnant and 50 non pregnant cows out of total 200 were included in present investigation to elucidate effect of plasma progesterone concentration on day 12 post-AI with pregnancy outcomes at 45 days post-AI.

#### 2.1. Blood collection

10 ml blood was collected from jugular vein in heparinized 15 ml centrifuge vials on day 12 post-AI. Blood was brought to laboratory in cool cage within two hours after collection. Centrifugation was done at 1500Xg for 15 minutes to separate plasma, and plasma aliquots were stored in duplicates at -20 °C until analysis.

#### 2.2. Hormonal analysis

Plasma progesterone was estimated using a commercially available Solid phase competitive ELISA Kit. In 100 cows (50 pregnant and 50 non-pregnant) selected out of total 200 cows.

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### 2.3. Statistical analysis

Statistical analysis was performed in computer based SPSS software. Numerical data were presented as mean±SE. The student's t-test was employed to measure the differences in plasma progesterone concentrations between pregnant and non-pregnant cows.

### 3. Results and Discussion

Retrospective analysis of plasma progesterone concentration on day 12 post-AI revealed that higher ( $p < 0.01$ ) concentrations were found in cows which were diagnosed pregnant on day 45 post-AI than cows which were diagnosed non-pregnant (Table 1).

**Table 1:** Plasma progesterone concentration (ng/ml) at day 12 post-AI in indigenous cows

	Plasma progesterone concentration(ng/ml)
Pregnant (n=50)	2.39±0.09
Non-pregnant (n=50)	1.51±0.08

The previous studies including *Bos taurus* (Pursely and Martins, 2012)<sup>[7]</sup> and buffalo (Pandey *et al.*, 2011, 2018)<sup>[5, 6]</sup> also showed increased progesterone concentration post-AI in pregnant cows. Study by Grimard *et al.* (2006)<sup>[3]</sup> observed that P<sub>4</sub> concentrations affected the pregnancy status and increased plasma P<sub>4</sub> concentration was conducive for establishment of pregnancy in cows. Luteal progesterone secretion stimulates endometrial secretions and embryonic growth development (Geisser *et al.*, 1992)<sup>[2]</sup>. Cows with higher circulating concentration of progesterone post-AI had embryos that produced more of the antiluteolytic protein interferon-tau by day 16 than cows that had low circulating concentrations of progesterone (Mann and Lamming., 2001)<sup>[4]</sup>.

### 4. Conclusion

In present study, higher plasma progesterone concentration were observed on day 12 post-AI in cows which were found to be pregnant 45 days post-AI than cows found to be non-pregnant. Thus, it may be concluded that higher plasma progesterone secretion post-AI is conducive for pregnancy.

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