



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(1): 2988-2990
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www.thepharmajournal.com

Received: 09-10-2022

Accepted: 22-11-2022

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Pattern of induced estrus during estrus synchronization with PGF_{2α} in Bargur cows

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Abstract

The experiment was conducted to study the pattern of induced estrus during the superovulatory protocol in Bargur cows. Total of 16 Bargur cows were selected and synchronized using 500µg of PGF_{2α} intramuscularly at 11 days apart. The Bargur donor cows were observed for estrus signs 24 hours after the second PGF_{2α} injection. The estrus response, onset of estrus, signs of estrus, duration of estrus and intensity of estrus were observed and recorded. The onset, duration and intensity of estrus was 45.94±1.35 hours, 24.38±0.57 hours, 68.75% (intense), 25% (intermediate) and 6.25% (weak), respectively in Bargur donor cows.

Keywords: Bargur, induced estrus, estrus pattern

Introduction

Bargur cattle is a medium sized cattle breed reared in the Bargur hills of Anthiyur taluk in Erode district. Animals of the breed resemble Mysore type cattle of South India, but differ from breeds like Hallikar and Alambadi by their colour and being smaller and compact in size. After the selection of donor cows, the first and basic step is synchronisation of estrus.

In estrus synchronization, the estrus cycle of animal is manipulated to bring a larger group of cows into estrus at short, pre-determined time (Odde, 1990) [8]. Various hormonal preparations like PGF_{2α}, progesterone, GnRH and estrogen could be used for estrus synchronization in bovines (Robin Salverson, 2020) [13]. Using PGF_{2α} or its analogue is one of the oldest way to synchronize estrus by luteolysis of CL (Murugavel *et al.*, 2003) [6]. Cattle injected with PGF_{2α} between days 5 and 9 were less responsive than those injected later in the cycle (Stevenson *et al.*, 1984 and Watts and Fuquay, 1985) [18, 21]. Sahatpure and Patil (2008) [14] reported that non-descript and crossbred cows treated with 25mg Lutalyse at 11 days apart showed 80% and 100% estrus rate, respectively. There is no literature regarding the pattern of synchronized estrus in Bargur cows. The present study is the first attempt in documenting estrus pattern during synchronized estrus in Bargur cows. The present study used double PG protocol to study the pattern of estrus in Bargur cows.

Materials and Methods

The present study was carried out in Bargur cows maintained at Department of Veterinary Gynaecology and Obstetrics, Veterinary College and Research Institute, Namakkal. A total of 16 healthy, pluriparous Bargur cows between the 2nd and 6th parity were chosen based on the phenotypic characteristics specific to the Bargur breed with no palpable genital tract abnormalities. The body condition score of the selected cows were between 3 and 4. The selected Bargur cows were synchronized using 500µg PGF_{2α} (Cloprostenol, PG Estro™, Hester Biosciences Ltd, India) which was administered intramuscularly at an interval of 11 days. All the cows were closely observed for estrus signs 24 hours after the second PGF_{2α} injection. The parameters studied are as follows.

- 1. Estrus response:** The estrus response was calculated in percentage as number of cows expressed estrus divided by number of cows treated and multiplied by 100.
- 2. Onset of estrus:** The onset of estrus was calculated in hours from the time of second PGF_{2α} injection to the onset of estrus symptoms.
- 3. Duration of induced estrus:** The duration of induced estrus was calculated in hours from the first appearance of estrus symptoms to the last evidence of estrus.

4. Intensity of induced estrus: Using a score card described by Selvaraju *et al.* (2005) [16] with slight modifications, the intensity of estrus was measured. In addition, the degree of estrus was divided into intense, intermediate and weak estrus according to types of symptoms. The details of score card used is given below.

Table 1: Score card

S. No	Parameters	Points
1	Behavioral changes	5
	Restlessness	2
	Bellowing	1
	Reduction in feed intake	1
	Tactile sensation in genital region	1
2	Physiological changes	5
	Vulval edema	2
	Highly edematous	2
	Edematous	1
	Not edematous	0
	Urination	1
	Genital discharge	2
	Copious	2
	Moderate volume	1
	Scanty	0
	Gynaecological observation	5
	Fern pattern	2
	Typical fern pattern	2
	Atypical fern pattern	1
	Rectal examination	2
	Cervical relaxation	2
	Uterine tonicity	2
	High	2
	Moderate	1
	Flaccid	0
	Total	15
	Based on the above score card, the intensity of estrus was classified as follows. Intense: 10-15 points Intermediate: 05-10 points Weak: 00-05 points	

Results and Discussion

In the present study, all the cows exhibited estrus (100%), following the second PGF_{2α} injection. Similar responses with double PG injection in crossbred cows was reported by Islam (2011) [2], in repeat breeder cows by Patil *et al.* (2021) [9] and Selvaraju *et al.* (2005) [15], Ratnaparkhi *et al.* (2020) [12] in crossbred dairy cows, Manokaran *et al.* (2021) [4] and Periyannan (2021) [10] in Kangayam cows. Whereas, Small *et al.* (2001) [17] and Venkata Ramana *et al.* (2013) [20] obtained 82 per cent estrus response following double PG protocol in cows. In another experiment, administration of PGF_{2α} on day 5 of estrus cycle caused 41 per cent estrus response in heifers and 0 per cent in both lactating and non-lactating cows. But when the PGF_{2α} was administered on day 7, 88 per cent estrus response in heifers and 90 per cent estrus response in non-lactating cows was observed. Thus, the differences in responsiveness of the early CL in different studies could be due to difference in physiological state or breed of cow used in different experiments (Nascimento *et al.*, 2014) [7]. The administration of PGF_{2α} at appropriate stage of estrus cycle is crucial for luteolysis to occur. Administration of PGF_{2α} during early CL period did not activate the intra luteal PGF_{2α} secretory pathways (Tsai and Wiltbank, 1998) [19]. Further the

treatment of early CL with PGF_{2α} did not activate cytokine pathways involved in activation of immune system (Luo *et al.*, 2011) [3]. These mechanisms explain the 100 per cent estrus response obtained in Bargur cows treated with double PGF_{2α}.

The average time taken for the onset of estrus following second PGF_{2α} injection in Bargur cows was 45.94±1.35 hours. Almost similar finding was reported by Manokaran *et al.* (2019) [5] in repeat breeder cows during high and low breeding season. Sahatpure and Patil (2008) [14] reported 54.40±2.60 and 54.58±3.28 hours for the onset of induced estrus in non-descript and crossbred cows treated with double PGF_{2α} injection respectively. Periyannan (2021) [10] recorded 56.40±2.20 and 61.0±1.86 hours for the onset of estrus in Kangayam cows following double PG protocol. Devipriya *et al.* (2020) [11] observed 62.0±6.95 and 38.0±5.66 hours for the onset of estrus in Kangayam and Jersey crossbred cows following estrus synchronization, respectively. The duration of induced estrus recorded was less than the previous records which might be due to the breed variation as the Bargur breed was used for the study. Further the nutritional status, season and type of estrus induction protocol adapted might also play a role as explained by Manokaran *et al.* (2019) [5] and Nascimento *et al.* (2014) [7].

In the present study, the mean duration of induced estrus in Bargur cows was 24.38±0.57 hours. The duration of induced estrus was calculated from the appearance of estrus signs to its disappearance as described by Selvaraju *et al.* (2010) [15] and Manokaran *et al.* (2021) [4]. Ratnaparkhi *et al.* (2020) [12] has reported 22.80±0.44 and 23.80±0.55 hours as mean duration of estrus following ovsynch and double PGF_{2α} protocol respectively in crossbred cows. Manokaran *et al.* (2021) [4] has recorded the mean duration of induced estrus of 17.0±1.17, 16.60±0.74, 17.20±0.95 and 16.30±0.74 hours in Kangayam cows treated with single PG, double PG, CIDR plus PGF_{2α} and ovsynch protocol, respectively which is lesser than the observations of the present study. Periyannan *et al.* (2021) [10] reported 18.25±1.40 hours as mean duration of estrus in Kangayam cows induced with double PGF_{2α}. Devipriya *et al.* (2020) [11] reported 18.0±0.26 hours after induction with intravaginal progesterone sponges in Kangayam cows. The duration of estrus observed in the present study is almost similar to *Bos taurus* cows.

The estrus intensity in induced estrus in Bargur cows was classified as intense, intermediate and weak estrus intensities and similar classification was used by Manokaran *et al.* (2021) [4] and Periyannan *et al.* (2021) [11]. The incidence of intense, intermediate and weak estrus intensities in Bargur cows was 68.75, 25 and 6.25 per cent respectively. Periyannan *et al.* (2021) [11] has recorded 62.5, 25 and 12.5 per cent estrus intensity in Kangayam cows synchronized with double PG protocol. Ratnaparkhi *et al.* (2020) [12] obtained 40, 40 and 20 per cent and 15, 30 and 20 per cent intense, intermediate and weak estrus intensity in crossbred cows treated with ovsynch and double PG protocol respectively. Manokaran *et al.* (2021) [4] has recorded 30, 50 and 20 per cent intense, intermediate and weak estrus intensity in Kangayam cows treated with double PG protocol. Selvaraju *et al.* (2005) [16] has recorded 12.5 and 87.5 per cent very good and good estrus intensity in crossbred cows administered with single PGF_{2α}. The higher intense and intermediate estrus intensity observed in the present study might be due to breed variation, nutritional status and sensitivity of the animals to

steroid hormones as explained by Selvaraju *et al.* (2005)^[16]. From the study it was concluded that the estrus response, onset of estrus, duration of estrus and intensity of estrus in Bargur cows was not affected by double PGF₂ α protocol in estrus synchronization in Bargur cows and this schedule can be best used for estrus induction in Bargur cows.

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