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Fertility response using timed insemination protocols in postpartum buffaloes

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Abstract

This experiment was conducted in 24 postpartum buffaloes. The experimental buffaloes were randomly divided into two groups, each comprising 12 animals (n=12). Animals of group-I were administered Buserelin acetate (20µg) intramuscularly at day 0, followed by Cloprostenol (500µg) intramuscularly on day 7 and same dose of second GnRH on day 9. However, in group-II all treatment was similar to group-I along with supplementation of *Murraya koenigii* (Curry leaf) (@ 20.75 g/100 kg body Wt.) and *Aegle marmelos* (Bael leaf) (@ 26.60 g/100 kg body Wt.) powder from day 0 to 6. The timed artificial insemination was performed at 12 and 24 hrs. After second GnRH injection in both the groups. Based on the intensity of the oestrus signs observed during fixed time artificial insemination the oestrus synchronization was graded as excellent, good, fair, poor and nil. The results revealed better grades of oestrus synchronization in leaves supplemented Ov-synch protocol as compared to the original Ov-synch, and comparatively high conception was recorded in curry leaf and bael leaf powder supplemented Ov-synch group than only Ov-synch group.

Keywords: Postpartum, buffalo, ov-synch, timed ai, oestrus synchronization

Introduction

Buffalo (*Bubalus bubalis*) is a premier milk producing animal of our country. Buffalo also play a significant role as drought and meat animal. However, buffalo is considered as the animal of poor reproductive efficiency due to several features includes delayed puberty and sexual maturity, sub-oestrus, an-oestrus and seasonality in breeding. Prolonged postpartum acyclicity (absence of ovarian cyclic activity) and an-oestrus (absence of overt oestrus signs) are major cause of economic loss to buffalo breeders.

Controlled studies in dairy buffaloes revealed that first ovulation as detected by rectal palpation and progesterone analysis occurred between 28–71 and 24–55 days, respectively, after calving. Postpartum oestrus in the same studies occurred between 44 and 87 days [1].

Data from Egypt, India and Pakistan indicate that only 34–49% of buffaloes showed oestrus during the first 90 days after calving and 31–42% remained an-oestrus for more than 150 days [2]. Hence to overcome these reproductive problems, the controlled breeding strategies have been advised in buffaloes. With the use of Ov-synch protocol, it is seen that pregnancy rates were 33.3% for Timed Artificial Insemination (TAI) and 30.7% for buffaloes inseminated following spontaneous oestrus [3]. With the use of modified Ov-synch protocol the synchronization of oestrus was 60 – 80% and conception rate was 20 – 40% in postpartum an-oestrus buffaloes [4]. Conception rate was found 46.66% and 73.30% in sub-oestrus buffaloes using Ov-synch and insulin modified Ov-synch protocol, respectively [5].

Some herbal preparations i.e. *Murraya koenigii* (Curry leaf) and *Aegle marmelos* (Bael leaf) have been found effective in reproductive problems of farm animals. *Murraya koenigii* have been shown to increase serum estrogen concentration in an-oestrus cattle [6]. It has been shown that combination of both the plants can induce oestrus, ovulation and restore appreciable fertility in an-oestrus animals [7, 8]. The shade dried leaves of *Aegle marmelos* and *Murraya koenigii* in combination as well as *Murraya koenigii* alone found effective for improving fertility in delayed pubertal buffalo heifers [9]. The leaves of *Murraya koenigii* are aromatic and contain proteins, carbohydrates, fiber, mineral like Mn, Cu, Fe, Zn, Co and carotene, vitamin C, vitamin A, calcium and oxalic acid [10].

Murraya koenigii along with *Aegle marmelos* powder have shown beneficial effect for management of an-oestrus cows. Hence, looking to the properties of these plants, it hypothesized that supplementation of *Murraya koenigii* and *Aegle marmelos* may enhance the efficacy of Ov-synch protocol for controlled breeding program in postpartum buffaloes.

Materials and Methods

The study was conducted in 24 apparently healthy postpartum dairy buffaloes maintained at organized dairy farms with the history of non-return to oestrus up to 45-60 days after calving. The selection of animals was done on the basis of history of non-return, having clinically developed ovaries, complete uterine involution and non-exhibition of oestrus after 10 days of gynaecological examination. The selection of animals was done on the basis of history of age, parity, BCS and gynaecological examination of genitalia.

Fresh green curry and bael leaves were purchased from local market and also collected from the nearby colonies and villages. Curry leaves and bael leaves were washed with plane water to remove dust and then shade dried at room temperature before use. After drying, plant leaves were grinded in pulverize to make it in the powder form. The dosage of leaf powder was calculated by dose extrapolation from rat to buffalo using dose equivalent system described by [11]. Approximately 20.75 g powder of curry leaves and 26.6 g powder of bael leaves per 100 kg body weight per day was fed orally.

The selected buffaloes were randomly divided into two groups, each comprising of 12 animals (n=12). Deworming with albendazol @ 10mg/kg body weight was done in all animals before the start of treatment to prevent them from the stress of parasitism. Animals of group-I were administered Buserelin acetate (20µg) intramuscularly at day 0, followed by Cloprostenol (500µg) intramuscularly on day 7 and same dose of second GnRH on day 9. However, in group-II all treatment was similar to group-I along with supplementation of *Murraya koenigii* (@ 20.75 g/100 kg body Wt.) and *Aegle marmelos* (@ 26.60 g/100 kg body Wt.) leaf powder from day 0 to 6. The timed artificial insemination was performed at 12 and 24 hrs. After second GnRH injection in both the groups. Fertility response was studied in terms of oestrus synchronization and conception rate. Oestrus synchronization pattern was graded as excellent, good, fair, poor and nil based on the intensity of the oestrus signs observed during fixed time artificial insemination as per the study of Gupta *et al.* (2015) [4].

Results and Discussion

Fertility response in postpartum buffaloes

Fertility response was studied in terms of intensity of oestrus sign during fixed time AI and conception rate. All animals were examined per rectally for pregnancy 60 days post insemination and fertility rate was calculated.

Grading of oestrus synchronization in postpartum buffaloes

Based on the intensity of the oestrus signs observed during fixed time artificial insemination, the oestrus synchronization was graded as excellent, good, fair, poor and nil and results are presented in table 01.

Table 1: Grading of oestrus synchronization in postpartum buffaloes

S. No.	Grades of oestrus synchronization	Group I (n=12)	Group II (n=12)
1.	Excellent	2 (16.66%)	3 (25.00%)
2.	Good	4 (33.33%)	3 (25.00%)
3.	Fair	4 (33.33%)	4 (33.33%)
4.	Poor	1 (8.330%)	1 (8.330%)
5.	Nil	1 (8.330%)	1 (8.330%)

*Chi value is 0.34; NS ($p>0.05$).

The analysis of results revealed that *M. koenigii* and *A. marmelos* leaf powder supplemented Ov-synch protocol (Group II) has better synchronization as compared to the original Ov-synch protocol (Group I). However, the difference was statistically non-significant ($p>0.05$).

No literature could be traced for comparing the oestrus induction rate/ synchronization after using *M. koenigii* and *A. marmelos* leaves powder in combination with Ov-synch protocol in postpartum buffaloes. However, Bisen *et al.* (2018) [5] observed excellent, good, fair, poor and nil synchronization patterns 40.00, 40.00, 13.33, 6.66 and 0.00% in insulin modified Ov-synch protocol, and 20.66, 40.00, 20.00, 6.66 and 6.66% in Ov-synch protocol, respectively.

In the present study, the oestrus response of 83.33% was recorded in postpartum buffaloes in *A. marmelos* and *M. koenigii* supplemented Ov-synch. However, Patel (2020) reported highest oestrus induction (70.00%) in *M. koenigii*, *A. marmelos* and mineral mixture supplemented cattle heifers. Das *et al.* (2012b) [12] reported 92.90% oestrus induction in delayed pubertal buffalo heifers after supplementation of *A. marmelos* and *M. koenigii* herbs for 9 days and Baitule *et al.* (2016) [9] found 75% and Dutt *et al.* (2011) [7] found 60% oestrus induction after supplementing *A. marmelos* and *M. koenigii* for 9 days in an-oestrous buffaloes.

Kumar *et al.* (2016) [13] reported that the follicular growth is a continuous process but may be interrupted at any stages of their terminal development in delayed pubertal heifers. They also reported that both the plants (*Aegle marmelos* and *Murraya koenigii*) promote largest follicle development beyond the dominant follicle size in delayed pubertal heifers. The medicinal plant leaves in the present study may have promoted the gonadotropins from anterior pituitary or may have some active principles that have promoted the terminal growth stage of follicular development during follicular wave resulting in induction of oestrus.

Fertility responses to fixed time insemination protocol in postpartum buffaloes

Fertility response to fixed time artificial insemination protocol in postpartum buffaloes was studied and results are presented in table 02.

Table 2: Fertility responses to fixed time insemination protocol in postpartum buffaloes

Particulars	Fertility responses to fixed time insemination	
	Group I	Group II
Animals inseminated (n)	12	12
Conceived (CR in %)	5 (41.67%)	7 (58.33%)
Not Conceived	7 (58.33%)	5 (41.67%)

*Chi value is 0.413; NS ($p>0.05$)

No literature could be traced for comparing the conception rate after using curry and bael leaves powder in combination with Ov-synch protocol in postpartum buffaloes. However, the lower conception rate was recorded in buffaloes with only Ov-synch protocol as compared to finding of Bisen *et al.* (2018) [5] who found 46.66% and 73.33% conception rate in Ov-synch and insulin modified Ov-synch protocol. Similarly, the conception rate calculated in G II buffaloes (58.33%) found to be lower than the reports of Das *et al.* (2012a) [14] and Dutt *et al.* (2011) [7] where conception rate was 71.40% and 66.67%, respectively in delayed pubertal heifers and an-oestrus buffaloes supplemented with *M. koenigii* and *A.*

marmelos and inseminated at induced oestrus.

However, Kumawat *et al.* (2016) ^[15] reported 61.50% conception rate after the supplementation of *A. marmelos* and *M. koenigii* leaves powder and Patel (2020) found highest conception rate (71.42%) supplemented with curry leaves, bael leaves and mineral mixture in delayed pubertal heifers.

Conclusions

It may be concluded that after the supplementation of curry leaf (*Murraya koenigii*) and bael leaf (*Aegle marmelos*) powder increase the efficacy of Ov-synch protocol and improve the conception rate in postpartum buffaloes.

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