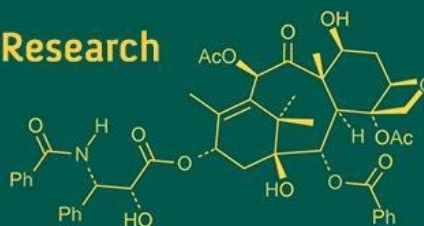


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Effect of the Co-Synch Estrus Synchronization protocol on reproductive performance in Crossbred Murrah Buffaloes

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Abstract

The present study work was conducted to assess the efficacy of Co-synch as an estrus protocol in Crossbred Murrah Buffalo with reference to occurrence of estrus and conception rate. Twelve buffalo cows were selected randomly in the field conditions near the villages of Kodanadu. All the study animals were divided into two groups (control and treatment). In the Co-synch group (n=8), 2.5 mL of GnRH was administered on day 0 and day 9, and on day 7, 2 mL of prostaglandin was administered and artificial insemination was performed at the time when the last injection of GnRH was administered and in the control group (n=8). Estrus response their showed significant difference among the treatment group. Co-synch group animals showed higher estrus response (7/8, 87.5%) as compared to control group (75%). Conception rate were showed significant difference among treatment group. Co-synch group animal showed significantly higher conception rate as compared to control group. It was concluded that Co-synch estrus synchronization protocol gave better results in terms of induction of estrus and conception rate.

Keywords: Estrus synchronization, Estrus, Conception rate, Insemination, Buffalo

Introduction

Artificial insemination (AI) is one of the major reproductive technologies developed during the twentieth century and has significantly contributed to genetic improvement and reproductive efficiency in livestock. However, successful implementation of AI largely depends on proper detection and timely expression of estrus, which often remains a major constraint under field conditions. To overcome this limitation, estrus synchronization has been developed as an essential reproductive management tool to induce estrus and improve the efficiency and adoption of AI (Lamb *et al.*, 2010) [9]. Several estrus synchronization methods have been developed in bovines with the objective of improving reproductive performance and facilitating fixed-time artificial insemination (Yusuf *et al.*, 2010; Ahmed *et al.*, 2011) [1, 17].

Sexual cycle synchronization refers to the use of exogenous hormonal protocols to regulate estrus and ovulation so that animals with functional estrous cycles within a herd express these events at a predetermined time. In cattle and buffaloes, estrous synchronization is based on two fundamental physiological mechanisms. The first involves shortening the luteal phase through administration of prostaglandin F_{2α} (PGF_{2α}) or its analogues, while the second aims to create a high progesterone environment using intravaginal devices or ear implants containing progesterone or synthetic progesterone derivatives. These hormonal interventions suppress the luteinizing hormone (LH) surge, thereby preventing ovulation, followed by controlled termination of the diestral phase.

Based on these mechanisms, several estrous synchronization protocols and their modifications have been developed, including Presynch, Ovsynch, Co-synch, and Double Ovsynch, either alone or in combination with progesterone supplementation. The Co-synch protocol follows a similar regimen to Ovsynch, with the major difference being that timed AI is performed concurrently with the final GnRH injection. Although these protocols are widely used in cattle, very limited information is available regarding their effectiveness in buffaloes (Stevenson *et al.*, 2006) [18]. Moreover, significant differences in reproductive physiology and anatomy between cattle and buffalo breeds adversely influence the success of

synchronization protocols and subsequent artificial insemination outcomes (Yilmaz *et al.*, 2011; Nabors and Linford, 2014; Varon, 2015; Peralta-Torres *et al.*, 2020; Du *et al.*, 2021).^[16, 10, 14, 11, 7]

Optimum fertility in repeat breeder buffaloes can be achieved through improved management and nutrition, along with the application of advanced reproductive technologies (Dhami *et al.*, 2009)^[6]. Therefore, the present study was designed to evaluate estrus response and conception rate in buffaloes using different estrus synchronization protocols.

Materials and Methods

Animals and management

A total of 16 buffalo were randomly selected in the field condition near the villages of Kodanadu during 2024-2025 to assess the efficacy of Co-synch as an estrus protocol in Crossbred Murrah Buffalo with reference to the occurrence of estrus and conception rate. All buffaloes were managed on semi-intensive management conditions. They were dewormed two weeks prior to the commencement of the experiment, and Agrimin® mineral mixture was supplemented at the rate of 50 g per animal per day until the start of the study to minimize nutritional variation. Routine farm feeding and watering practices were followed uniformly for all animals during the experimental period. Before initiation of the synchronization, pregnancy was ruled out in all animals by per-rectal examination.

Synchronization

The animals were randomly allocated into two groups: Control (n = 8) and Co-synch (n = 8). On day 0, buffaloes in the Co-synch group received an intramuscular injection of 2.5 mL GnRH analogue (Buserelin acetate, 4 µg/mL; Gynarich®). On day 7, 2 mL of PGF_{2α} analogue (250

µg/mL; Pragma®) was administered intramuscularly. A second dose of GnRH (2.5 mL) was given on day 9, followed by artificial insemination (Akhtar *et al.*, 2013)^[2] and (Bastan *et al.* 2021)^[3].

Pregnancy Detection

Pregnancy diagnosis was carried out on day 45 post-insemination by per-rectal examination and ultrasonographic imaging.

Statistical Analysis

The data were analyzed using the chi-square (χ^2) test to compare differences between the control and Co-synch groups. A p-value of less than 0.05 was considered statistically significant. The analyses were performed using SPSS version 24.0

Results

The estrus response and conception rate of Crossbred Murrah buffaloes subjected to the Co-synch estrus synchronization protocol were compared with those of the control group. In the Co-synch group, 7 out of 8 buffaloes (87.5%) exhibited estrus, while 6 out of 8 (75%) in the control group showed estrus. The statistical analysis revealed no significant difference in estrus response between the two groups ($P > 0.05$), although the Co-synch group showed a numerically higher response. A marked difference was observed in conception rate. Only 1 out of 8 animals (12.5%) in the control group became pregnant, whereas 7 out of 8 (87.5%) in the Co-synch group conceived. The statistical analysis confirmed this difference to be significant ($P < 0.05$). These results indicate that the Co-synch protocol significantly improved conception rates compared to routine management.

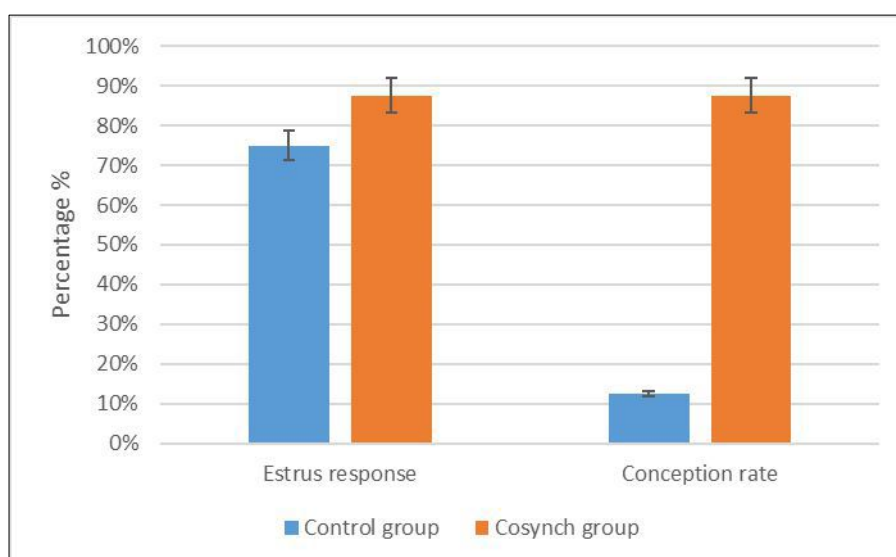


Fig 1: Comparison of Estrus Response and Conception Rate between Control and Co-synch Groups

Discussion and Conclusion

The present study demonstrated that the application of the Co-synch estrus synchronization protocol significantly improved estrus response and conception rate in Crossbred Murrah buffaloes compared to the control group. The improved estrus response observed in the Co-synch group can be attributed to the controlled manipulation of ovarian follicular dynamics achieved through sequential hormonal

administration. Administration of GnRH on day 0 is known to initiate a new follicular wave or induce ovulation of an existing dominant follicle. Subsequent administration of PGF_{2α} on day 7 induces luteolysis of the corpus luteum, resulting in a decline in circulating progesterone levels. Since progesterone suppresses the luteinizing hormone (LH) surge, its removal facilitates estradiol dominance and expression of estrus. The final GnRH injection administered

on day 9 induces a synchronized LH surge, leading to ovulation of the dominant Graafian follicle and optimal synchronization with artificial insemination (Stevenson *et al.*, 2012; Carvalho *et al.*, 2015) [13, 5].

The lower estrus response observed in the control group may be attributed to reliance on spontaneous estrus expression and visual detection. Buffaloes are known to exhibit weak or silent estrus, particularly under tropical climatic conditions, which compromises estrus detection efficiency and leads to missed or improperly timed inseminations. A substantially higher conception rate was recorded in the Co-synch group compared to the control group. The poor conception rate observed in the control group may be due to inaccurate estrus detection, improper timing of insemination, and variability in ovulation timing. In buffaloes, delayed and less predictable ovulation often reduces fertilization success when insemination is not synchronized. Several studies have reported conception rates ranging from 33.3% to 62.5% following the use of the Co-synch protocol (Sharma *et al.*, 2021; Biradar *et al.*, 2016; Kumar *et al.*, 2016) [12, 4, 8]. The higher conception rate observed in the present study suggests that favorable management practices, nutritional status, and controlled breeding conditions may enhance the effectiveness of the protocol. Adequate nutrition and mineral supplementation are known to support ovarian activity and early embryonic development, thereby improving fertility outcomes. In contrast to the findings of Wagon *et al.* (2019) [15], where higher conception rates were reported with the Ovsynch protocol, the present study recorded superior results with the Co-synch protocol. Such variations may be attributed to differences in climatic conditions, nutritional status, breed, age, and overall management practices.

In conclusion, the Co-synch estrus synchronization protocol was found to be effective in improving estrus response and conception rate in Crossbred Murrah buffaloes. The protocol offers a practical and efficient approach to fixed-time artificial insemination by overcoming limitations associated with estrus detection and variability in ovulation in buffaloes.

References

- Ahmad S, Kumar H, Singh G, Patra MK. Administration of GnRH plus PGF2 α synchronizes estrus in anestrus crossbred cows exposed to bull urine. *Indian Journal of Veterinary Research*. 2011;20:42-45.
- Akhtar MS, Ullah S, Farooq AA, Mazhar M, Murtaza S. Pregnancy rate in lactating buffaloes treated with or without estradiol after estrus synchronization protocols at timed artificial insemination. *Buffalo Bulletin*. 2013;32:366-369.
- Bastan I, Korkmaz F, Şahin D, Şimşek S, Satılmış M. First commercial semen cryopreservation and main spermatological features of Anatolian buffalo. *Livestock Studies*. 2021;61(2):60-65.
- Biradar S, Tandle MK, Suranagi MD, Usturge SM, Patil NA, Babu YH. Efficacy of Co-synch and Ovsynch protocols on fertility in repeat breeder buffaloes. *Buffalo Bulletin*. 2016;35(4):737-743.
- Carvalho PD, Wiltbank MC, Fricke PM. Manipulation of progesterone to increase ovulatory response to the first GnRH treatment of an Ovsynch protocol in lactating dairy cows receiving first timed artificial insemination. *Journal of Dairy Science*. 2015;98(12):8800-8813.
- Dhami AJ, Butani MG, Sharma SK. Therapeutic management of repeat breeding buffaloes with hormones and antibiotics under field conditions. *Intas Polivet*. 2009;10(1):39-44.
- Du C, Nan L, Sabek A, Wang H, Luo X, Hua G *et al.* Evaluation of Ovsynch versus modified Ovsynch programs on pregnancy rate in water buffaloes: a meta-analysis. *Tropical Animal Health and Production*. 2021;53:1-12.
- Kumar L, Phogat JB, Pandey AK, Phulia SK, Kumar S, Dalal J. Estrus induction and fertility response following different treatment protocols in crossbred Murrah buffaloes under field conditions. *Veterinary World*. 2016;9(12):1466-1472.
- Lamb GC, Dahlen CR, Larson JE, Maquezini G, Stevenson JS. Control of the estrous cycle to improve fertility for fixed-timed artificial insemination in beef cattle: a review. *Journal of Animal Sciences*. 2010;88:181-192.
- Nabors B, Linford R. Anatomy of the reproductive system of the cow. *Bovine Reproduction*. 2014:191-194.
- Peralta-Torres JA, Torres-Chable OM, Segura-Correa JC, Ojeda-Robertos NF, Chay Canul AJ, Luna-Palomera C, *et al.* Ovarian dynamics of buffalo (*Bubalus bubalis*) synchronized with different hormonal protocols. *Tropical Animal Health and Production*. 2020;52:3475-3480.
- Sharma K, Phogat JB, Pandey AK, Dhaka AP, Singh S, Ghadwal S. Role of progesterone supplementation in estrus induction in crossbred Murrah buffaloes under field conditions during the non-breeding season. *Buffalo Bulletin*. 2021;40(1):99-106.
- Stevenson JS, Pulley SL, Mellieon HI Jr. Prostaglandin F2 α and gonadotropin-releasing hormone administration improve progesterone status, luteal number, and proportion of ovular and anovular dairy cows before a timed artificial insemination program. *Journal of Dairy Science*. 2012;95(4):1831-1844.
- Varon GJ. Reproductive application of ultrasound in the female buffalo (*Bubalus bubalis*). In: Purohit GN, editor. *Bubaline Theriogenology*. 2015:570-589.
- Wagan SA, Memon AA, Kalwer Q, Korejo RA, Khokhar TA, Khoso ZA, Hussain M. Efficacy of estrous synchronization protocols Ovsynch and Co-synch in Kundhi buffalo heifers. *IOSR Journal of Agriculture and Veterinary Science*. 2019;12:9-11.
- Yilmaz O, Yazici E, Ucar M. Measurements of some genital tract organ sizes in Anatolian water buffaloes. *Kafkas Üniversitesi Veteriner Fakültesi Dergisi*. 2011;17(6):921-926.
- Yusuf M, Nakao T, Yoshida C, Long ST, Fujita S, Inayoshi Y *et al.* Comparison of Heatsynch with heat detection aids and CIDR-Heatsynch in dairy heifers. *Reproduction in Domestic Animals*. 2010;45:500-504.
- Stevenson JS, Pursley JR, Garverick HA, Fricke PM, Kesler DJ, Ottobre JS *et al.* Treatment of cycling and noncycling lactating dairy cows with CIDR progesterone during the Ovsynch protocol. *Journal of Dairy Science*. 2006;89(7):2567-2578.