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M Praveen Kumar
Ph.D. Scholar, Department of Veterinary Gynaecology and Obstetrics, NTR College of Veterinary Science, Sri Venkateswara Veterinary University, Tirupati, Andhra Pradesh, India

K Veera Bramhaiah
Professor, Department of Veterinary Gynaecology and Obstetrics, College of Veterinary Science, Sri Venkateswara Veterinary University, Tirupati, Andhra Pradesh, India

M Mutha Rao
Professor, Officer-Incharge LAM, Department of Veterinary Gynaecology and Obstetrics, Sri Venkateswara Veterinary University, Tirupati, Andhra Pradesh, India

Corresponding Author
M Praveen Kumar
Ph.D. Scholar, Department of Veterinary Gynaecology and Obstetrics, NTR College of Veterinary Science, Sri Venkateswara Veterinary University, Tirupati, Andhra Pradesh, India

Ovarian response in post-partum anestrus buffaloes synchronized with Ovsynch and Ovsynch + CIDR protocols

M Praveen Kumar, K Veera Bramhaiah and M Mutha Rao

Abstract
The present study was undertaken by utilizing 14 postpartum anestrus buffaloes to study the ovarian response when synchronized with Ovsynch (Group I) and Ovsynch + CIDR (Group II) by transrectal ultrasound scanning. Synchronization of these postpartum anestrus buffaloes with Ovsynch and Ovsynch + CIDR protocols, resulted into an insignificant (P>0.05) increase in the diameter of the follicle from the day of initiation of protocols (7.93±0.70 mm) to the day of prostaglandin administration (8.50±0.27 mm) and to the day of insemination (9.50±0.24 mm) in Group I. Similarly, in Group II also the diameter was increased from 8.21±0.63 to 8.57±0.37 and reached to 11.64±0.28mm, respectively. The difference in the maximum diameter of follicle between the groups was significant (P<0.05) and it was significantly (P<0.05) higher on the day of insemination and insignificantly (P>0.05) higher at the time of initiation of treatment and on the day of PG administration during synchronization with Ovsynch + CIDR compared to Ovsynch protocol. The mean diameter of corpus luteum was 17.39 ± 0.58 mm on the day of prostaglandins administration in Group I, while 18.39 ± 0.70 mm in Group II buffaloes and difference was significant (P<0.05) between groups.

Keywords: buffalo, ovarian response, Ovsynch, Ovsynch + CIDR, post-partum anestrus, ultrasound examination

Introduction
Buffaloes are poor breeders with delayed onset of puberty, long postpartum ovarian quiescence, poor signs of estrus and long inter-calving intervals [1]. Reproductive efficiency is largely dependent on maintaining a short breeding and calving season and increasing calf number in order to maintain calf per a year. It is in turn depends on uterine involution, resume ovarian function, ovulation and pregnancy within 80 to 85 days after calving. But major limitation to the success of rebreeding after each calving is postpartum anestrus (Singh and Sahni, 1995) [2] with functional disorder of ovaries and constitute to about 65% (Rao and Sreemannarayana, 1982) [3], 19 to 74% (Vale, 1994) [4] and 90% (Singh *et al.*, 1984) [5].
Anestrus was generally defined as the state of ovarian acyclicity, reflected by complete sexual inactivity without manifestation of estrus with the absence of palpable follicular or luteal structures [6]. Ovarian follicle is central to reproduction and plays an integral part in regulating the oestrous cycle. The pattern of follicular development and regression of follicles indicate the functionality of follicular dynamics in buffaloes [7].
Ultrasonography of ovarian structures is a reliable and accurate method for identifying and measuring follicles [8]. No information is available in the literature on the aspects of the pattern of ovarian follicle development and CL formation in post-partum anestrus buffaloes synchronized with Ovsynch and Ovsynch + CIDR. Hence, the present study was aimed to monitor the ovarian response in case of post-partum anestrous buffaloes by ultrasound scanning of the ovaries during synchronization period.

Materials and Methods
Location and selection of buffaloes
The present study was carried at Livestock Research Station, located at Venkata ramannagudem, West Godavari district, AP. A total of fourteen buffaloes having 60 days and above post-partum period were utilized in the present study.

Management of buffaloes
All the animals were maintained under uniform managemental and husbandry conditions in well-ventilated asbestos roofed sheds with cemented anti-slippery floor with stall feeding mainly on paddy straw, Napier grass and concentrate mixture at the rate of 2-5 Kg/day with free access to water. The animals are hand milked twice daily and calves were allowed to suckle the dams.

Grouping of buffaloes
A total of 14 post-partum anestrus buffaloes without presence of corpus luteum after ultrasonic examination (sonoray DS-30 plus portable LCD B/W ultrasound scanner with 7.5 MHz linear-array transducer) in two successive intervals, 10 days apart and also based on the examination of ovaries for follicle development on every alternate day for a period of 16 days, were divided randomly into two groups and assigned to Group I (Ovsynch; n=7) and Group II and (Ovsynch + CIDR; n=7).

Group I (Ovsynch)
In this group, all the post-partum anestrus buffaloes were administered with 10 µg of GnRH (Receptal, Intervet, Holland) intramuscularly on day 0, 500 µg of Cloprostenol Sodium (Vetmate, Vet care, India) intramuscularly on day 7 and again 10 µg of GnRH (Receptal) intramuscularly on day 9. Fixed time AI (FTAI) was performed at 16 to 24 h after 2ndGnRH injection using frozen thawed semen of a fertile bull with minimum 50 per cent post thaw motility.

Group II (Ovsynch + CIDR)
In this group, all the post-partum anestrus buffaloes were administered with 10 µg of GnRH (Receptal, Intervet, Holland) intramuscularly and also inserted CIDR (EAZI-Breed, Pfizer Animal Health, NewYork) impregnated with 1.38 g of progesterone in the silastic coil on day 0, 500mcg of Cloprostenol Sodium (Vetmate, Vet care, India) intramuscularly and removed the CIDR on day 7 and again 10 µg of GnRH (Receptal) intramuscularly on day 9. Fixed time AI (FTAI) was performed at 16 to 24 h after 2ndGnRH injection using frozen thawed semen of a fertile bull with minimum 50 per cent post

Ultrasonographic examination of ovary
Ultra-sound scanning of the ovaries is performed in all the buffaloes selected anestrus buffaloes were scanned and evaluated on day zero (Day of initiation of treatment), day 7 to detect the presence of corpus luteum (CL) mm, day 10 at AI to measure the size of pre-ovulatory follicle (mm) (Figure 1).

Results and Discussion
Follicle and corpus luteum development in post-partum anestrus buffaloes adopted with Ovsynch and Ovsynch+ CIDR protocols were represented in Table 1 and Figure 1 and 2.

i) Follicular diameters during synchronization
The mean diameter of the follicle during the period of synchronization of postpartum anestrus buffaloes was 7.93±0.70 (range from 5.50 to 11.00), 8.50±0.27 (range from 8.00 to 9.50) and 9.50±0.24 (range from 8.50 to 10.50) mm on the day of initiation of protocol (day 0), on the day of prostaglandin (day 7) and on the day of insemination (day 10), respectively in Group I, while the same in Group II buffaloes was 8.21±0.63 (range from 6.00 to 11.00), 8.57±0.37 (range from 6.50 to 9.50) and 11.64±0.28mm (range from 10.50 to 12.50), respectively (Table 1; Figure 2). The difference in the mean maximum diameter of follicle between Ovsynch and Ovsynch + CIDR protocols was significant (P<0.05). Similarly the difference in the follicle diameter was significantly (P<0.05) higher on the day of insemination in postpartum anestrus Buffaloes synchronized with ovsynch + CIDR protocol compared to ovsynch protocol, but the same at the time of initiation of treatment and on the day of PG administration was insignificantly (P>0.05) higher with ovsynch + CIDR protocol (Table 2).
In both the protocols administration of first GnRH causes emergence of follicle to induce ovulation of the dominant follicle which is followed by wave emergence 1-2 days later [9, 10]. Ovulation of existing follicle after administration of first GnRH, the ovulatory response was increased by causing a persistent follicle to develop with the administration of PGF2α and the insertion of a CIDR device 7 days before the administration of GnRH [11].
In the present study, mean higher diameter of the follicle in group II buffaloes indicates that the follicles are dominant and functional and would show increase in LH receptors in granulosa cells leading to high ovulation rate [12]. The positive effect of progesterone in group II anestrus buffaloes on the diameter of the dominant follicle has been reported [13].

ii) Corpus luteum diameter during synchronization
The mean diameter of corpus luteum during the period of synchronization of postpartum anestrus buffaloes was 17.39±0.58 (range from 15.40 to 19.90) mm on the day of prostaglandins administration in Group I, while the same in Group II buffaloes was 18.39±0.70 (range from 15.58 to 21.68 mm) (Table 1; Figure 2). The difference in the mean maximum diameter of corpus luteum was significant (P<0.05) on the day of prostaglandin administration (P<0.05) (Table 2). The mean diameter of corpus luteum on day 7 observed in Ovsynch group (17.39 ± 0.58 mm) of the present study is in agreement with McArt *et al.* (2010) [14] (18.5±0.7 mm) but in contrast with lesser values recorded by Ghuman *et al.* (2012) [15] (9.4±2.3 mm) and Rathore *et al.* (2017) [16] (9.62 ± 0.55 mm). The mean diameter of corpus luteum on day 7 observed in Ovsynch + CIDR (18.39 ± 0.70 mm) group of the present study is in contrast with the lesser values of Ghuman *et al.* (2012) [15] (10.6±1.3 mm).

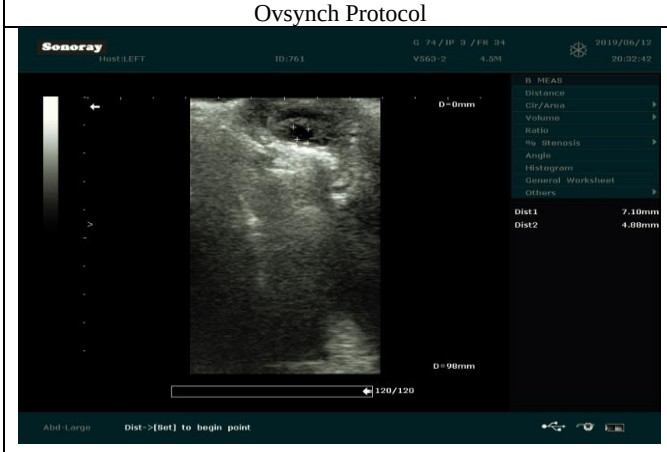
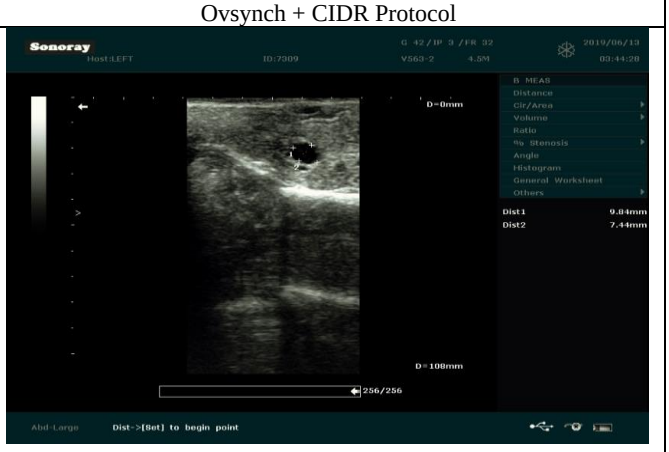
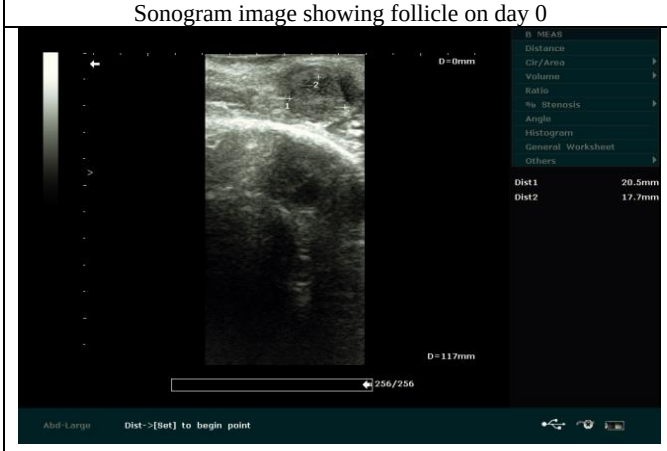
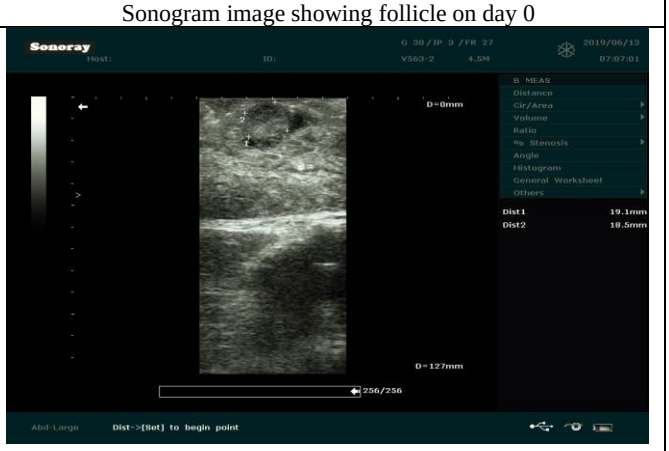
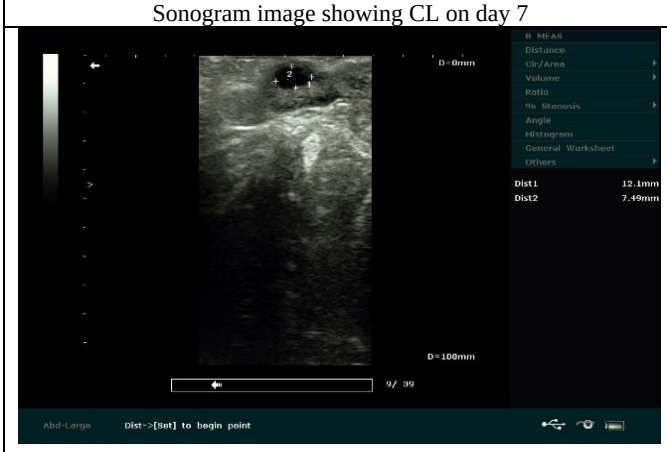
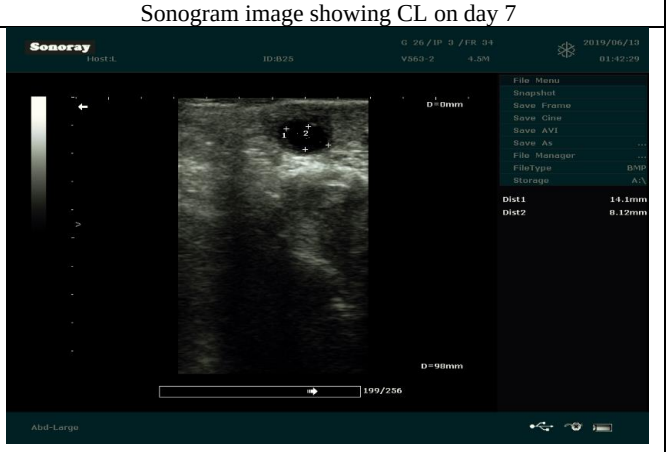
Ovsynch Protocol	Ovsynch + CIDR Protocol
	
Sonogram image showing follicle on day 0	Sonogram image showing follicle on day 0
	
Sonogram image showing CL on day 7	Sonogram image showing CL on day 7
	
Sonogram image showing pre-ovulatory follicle on the day of AI	Sonogram image showing pre-ovulatory follicle on the day of AI

Fig 1: Sonogram images of follicle and corpus luteum development in post-partum anestrus buffaloes administered with Ovsynch and Ovsynch+ CIDR protocols

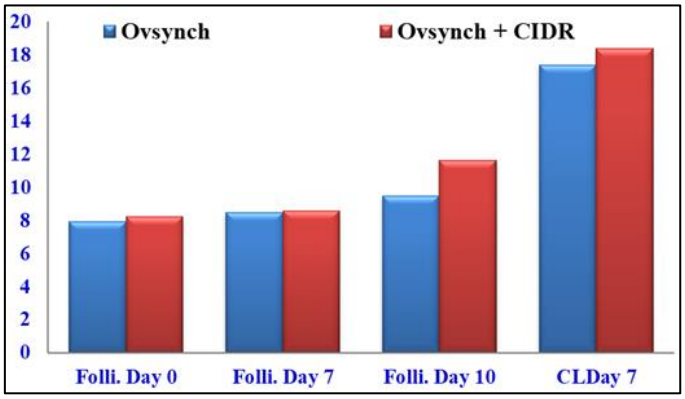


Fig 2: Follicular development on different treatment days and corpus luteum diameter on day 7 in post-partum anestrus buffaloes synchronized with Ovsynch and Ovsynch + CIDR protocols

Table 1: Characteristics of Follicle and Corpus luteum development in post-partum anestrus buffaloes synchronized with Ovsynch and Ovsynch+ CIDR

S. No.	Particulars	Group I N = 7	Group II N = 7	t -value	Overall
	Follicle diameter (mm)				
1	At the time of initiation of treatment (Day 0)	7.93±0.70	8.21±0.63	-0.34^{NS}	8.07±0.32^{a}
2	On the day of PG administration (Day 7)	8.50±0.27	8.57±0.37	-0.20^{NS}	8.54±0.32^{a}
3	On the day of Insemination (Day 10)	9.50±0.24	11.64±0.28	-5.30*	10.57±0.32^{b}
	Overall	8.64±0.26^{A}	9.48±0.26^{A}		
4	Corpus luteum diameter (mm)on the day of PG administration (Day 7)	17.39±0.58^{a}	18.39±0.70^{b}	-03.98*	

Means bearing different superscripts (a, b) within a row differ significantly $P \leq 0.05$
Means bearing different superscripts (A, B) within a column differ significantly $P \leq 0.05$

Table 2: Analysis of variance of Follicular development in Post-partum Anestrus Buffaloes synchronized with Ovsynch and Ovsynch+ CIDR

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Value
Between Groups	1	7.29	7.29	5.08*
Error	36	51.71	1.44	
Within Group 1	2	8.86	4.43	3.04^{NS}
Error	20	35.07		
Within Group 2	2	49.74	24.87	17.55*
Error	20	75.24		

*: Significant ($P \leq 0.05$)
NS: Non-significant ($P \geq 0.05$)

Conclusion

Synchronization of postpartum anestrus buffaloes with Ovsynch + CIDR protocol was able to produce functional dominant ovulatory follicle than Ovsynch protocol. Hence, the present study state that Ovsynch + CIDR protocol was superior in getting resumption of ovarian activity in postpartum anestrus buffaloes.

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