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Research Article

FOLLICLE WAVE PATTERNS IN POST-PARTUM ANESTROUS MURRAH BUFFALOES

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Abstract: Follicular wave patterns were studied in anoestrous buffaloes before (Group-I, control, n=5) and after either progesterone (Group-II, n=5) or progesterone + Pregnant Mare Serum Gonadotrophins (Group-III, n=6) therapy. Two-wave pattern (50% buffaloes) was predominant, followed by 3-wave (38%) and one-wave pattern (12%). None of the treatment affected the wave-patterns. However, inter-wave period was reduced to 6 days after P_4 + PMSG treatment. None of the buffaloes resumed cyclicity after P_4 treatment whereas, 67% buffaloes became cyclic following P_4+PMSG therapy. In conclusion, the follicular growth in anoestrous buffaloes occurs in waves but follicles failed ovulation.

Keywords: Follicles, Hormones, Buffaloes, Ultrasound, Anestrous

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Introduction

Buffalo plays major role in dairy industry in Indian subcontinent due to its higher feed conversion ratio and resistance to certain diseases. However, anoestrous is the foremost cause of infertility in buffalo [1]. Though follicular development continues in bovine during pregnancy [2] and postpartum period [3], the dominant follicle fails to achieve ovulatory size [5]. One-wave, two-wave and three-wave pattern of follicular development reported in cycling buffaloes by [5,6]. However, such information was lacking in anoestrous buffaloes. Also, the hormonal treatments designed earlier to control follicular waves in quiescent ovaries to initiate cyclicity with variable response. So, the present study was designed aiming to study the wave pattern in Post-Partum anoestrous buffaloes to better deal with the problem of variable response to treatment for induction of estrus.

Materials and Methods

The present study was performed in 16 postpartum healthy anoestrous Murrah buffaloes at Dairy Farm, Punjab Agricultural University, Ludhiana from January to July in 2003. Follicular growth pattern recorded Ultrasonographically on alternate day for 21 days in Group-I (Control group-n=5), Group-II (n=5, administered 750 mg hydroxy progesterone hexanoate BP (Pregneforte®, Venus Remedies Limited, Panchkula, Haryana, i.m. on days 1, 4 and 7 of the experiment and in Group-III (n=6, administered Progesterone + Pregnant Mare Serum Gonadotrophin therapy group hydroxy progesterone hexanoate BP injection as in Group-II followed by 750 IU PMSG (Folligon®, Intervet (India) Private Limited, Hyderabad, i.m.) on day 10 *i.e.*, 72 h after 3rd injection of progesterone.

Ultrasonographic Technique

Ovaries were scanned by a real time B-mode (5MHz) trans-rectal ultrasound scanner (Concept MCV, dynamic imaging, Scotland, U.K.,) in several planes of its free surface area to identify the number and different sizes of follicles (more than 2 mm). The image was retained on the screen, and number and size of follicles were recorded. Diagrams of the relative positions of the follicles were drawn. As many follicles (dark, anechogenic spherical structure surrounded by a fine wall) as possible were individually identified by referring to the records of the previous day [5]. The follicular diameter was measured against the in-built millimetre scale displayed on the screen alongside the ultrasound image. The diameter of non-spherical follicles was calculated by taking the average of the longest and widest measured point of the follicles [6].

Statistical Analysis

The means size of largest anovulatory follicles in various groups were compared each other using Student's t-test with the level of significance at $P<0.05$ [7].

Results and Discussion

Follicular Waves

Four in control Group, one in Group-II and three in Group-III buffaloes showed two-wave pattern of follicular development. One buffalo in Group-I, three buffaloes in Group-II and two in Group-III had three-waves. One buffalo each in Group-II and -III showed one- wave [Table-1]. However, two-wave pattern was predominant (63.3-83.3 %) in cycling Murrah buffaloes [5, 6] and 3-waves (70.59%) and 2-waves (23.53%) in Kenyan Boran cycling cows [8].In three-wave patterns the average inter-wave interval was markedly shortest ($P>0.05$) in Group-III (6.0 days) buffaloes than that of control (12.0 days) and Group-II (12.0±2.0 days) buffaloes [Table-1]. Similarly, in two-wave pattern the average inter-wave interval were 14 (Group-I) and 12 (Group-II) days, respectively. An interval of 9.2±0.11 days between two waves was reported in cycling buffaloes [5, 6]. Short inter-wave interval for three-wave in Group-III might be due to the stimulatory effect of PMSG, leading to early emergence of third-wave after treatment. The mean size of largest anovulatory follicle recorded were 8.7±0.82 and 10.8±0.51mm 15.2±1.37 mm in Groups-I, II & III buffaloes respectively [Table-1]. The follicle size was significantly greater ($P<0.05$) in Group-III buffaloes. Anovulatory follicle in anoestrous beef cows was 13.2±0.37mm and in cyclic buffaloes was 12.4±0.81mm [6].

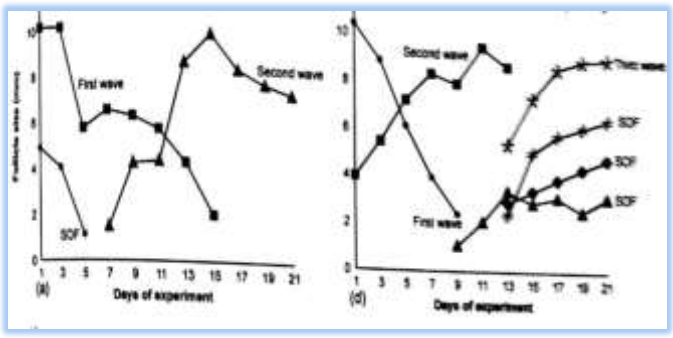

Fig-1 Follicular waves in control buffalo

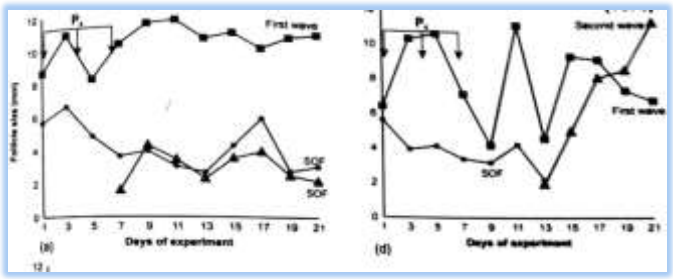

Fig-2 Follicular waves in buffalo with Progesterone Therapy

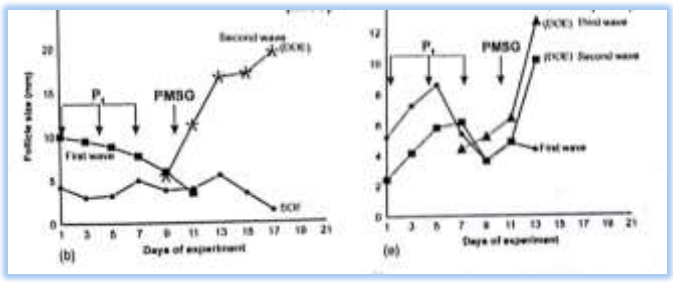

Fig-3 Follicular waves in buffalo with Progesterone+PMSG Therapy

In present study, the larger size of ovulatory follicle in Group-III may be due to stimulatory effect of PMSG [9]. Most of the observed waves in this study were anovulatory it might be due to limited peaks of FSH and LH sufficient to promote the development of follicles to the preovulatory phase and resulting into ovulation [10].

Fig-4 Characteristics of ultrasonographic imaginations of smaller and large anovulatory follicles in anestrous buffaloes

Effect of hormonal therapy

Four buffaloes (4/6) resumed cyclicity in Group-III (67%) following treatment (but ovulations not detected) which is comparable to the earlier study [11, 12]. Higher response to progesterone and gonadotrophin combination therapy reported in anoestrous buffaloes following supplementation of either Urea Molasses Multinutrient Block 80%, [12] or minerals 91.3%, [13] or without any supplementation (90% in cows and 87.5% in buffaloes, [14]. Better estrus induction response in Group-III in the present study might either be due to stimulatory effect of PMSG [15] or due to increased estradiol production by combined therapy leads to behavioural estrus [16]. The responding buffaloes exhibited oestrus symptoms following PMSG administration at an interval of 82.5±21.9 h (42-138 h). The variation in the interval between treatments to estrus induction in Group-III buffaloes could be attributed to a possible variation in their inherent endocrine status resulting in differing dose response in terms of time taken for maturation of graffian follicles [17]. None of the buffaloes came into heat following progesterone therapy in present study. About 30% success recorded by [18]. However, 80% oestrus response in postpartum anoestrous buffaloes observed following progesterone (50 mg) therapy for 5 days [19].

Table-1 *Characteristics of wave pattern and development of follicle (Mean±SE) in anoestrous buffaloes*

Observations	Group-I(n=5)	Group-II(n=5)	Group-III (n=6)
Three-wave pattern	1/5 (20%)	3/5 (60%)	2/6 (33.3%)
Inter-wave interval (days)	12 (n=1)	12±2.0 (n=3)	6.0 (n=2)
Two-wave pattern	4/5 (80%)	1/5 (20%)	3/6 (50%)
Inter-wave interval (days)	14 (n=1)	12 (n=1)	--
One-wave pattern	---	1/5 (20%)	1/6 (16.7%)
Average size of largest anovulatory follicles (mm)	8.7±0.8[a]	10.8±0.5[a]	15.2±1.4[b]

[a,b] differ significantly (P<0.05)

Conclusion

Two-wave pattern was predominant (50%), followed by three-wave (38%) and one-wave (12%) pattern in anestrous buffaloes. The P4 + PMSG therapy hastened the growth of follicles leading to oestrus in 67% of the treated buffaloes.

Application of research: It will helpful for managing the anestrous buffaloes in India and other places. It will be a reference for other research workers in this field.

Research Category: Veterinary and Animal Science

Abbreviations: P_4 –progesterone, PMSG-Pregnant mare serum gonadotrophins, E_2 -Estrogen

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Conflict of Interest: None declared

Ethical approval: Ethical approval taken from Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, 141012, Punjab, India

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