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## Is one-wave follicular growth during the estrous cycle a usual phenomenon in water buffaloes (*Bubalus bubalis*)?☆

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### Abstract

The pattern of growth and regression of ovarian follicles was monitored once daily for one complete estrous cycle in eight individual water buffaloes by ultrasonographic scanning of the ovaries for an entire interovulatory interval of normal cycle length. One-wave follicular growth was observed in five animals and two-wave follicular growth in three buffaloes during the estrous cycle. The first follicular wave of a two-wave cycle emerged significantly earlier ( $P < 0.05$ ) than the emergence of the solitary wave of a one-wave cycle. One- and two-wave cycles differed significantly ( $P < 0.05$ ) with respect to the mean interovulatory interval ( $21.0 \pm 0.54$  days versus  $22.7 \pm 0.33$  days) and the mean interestrus interval ( $20.8 \pm 0.58$  days versus  $22.3 \pm 0.66$  days). The overall linear growth rate of the ovulatory follicle was significantly greater ( $P < 0.01$ ) in a two-wave cycle compared to that of a one-wave cycle ( $1.17 \pm 0.33$  mm/day versus  $0.32 \pm 0.01$  mm/day). In a one-wave pattern, the growth profile of the solitary dominant follicle was atypical, showing three distinct phases, i.e. growth phase,

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regression phase and regrowth phase culminating in ovulation. The level of plasma progesterone steadily increased from day 0 of estrous cycle, attained peak level on day 14 and declined thereafter. A slower growth rate of the dominant follicle was observed in the presence of higher plasma progesterone concentration. The present study shows that one-wave follicular growth is a normal phenomenon in suckled water buffaloes.

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*Keywords:* Water buffalo; Ultrasonography; Follicular dynamics; Estrous cycle; Plasma progesterone

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## 1. Introduction

Analyses of various ultrasound studies on follicular dynamics show that cattle usually have two- or three-waves of follicular development during their estrous cycle (Pierson and Ginther, 1987a; Ireland, 1987). Similarly, two- and three-wave patterns of follicular growth have been reported in water buffaloes (Baruselli et al., 1997; Manik et al., 1998). However, only one study indicated the occurrence of one-wave follicular growth in water buffaloes (Taneja et al., 1996), but the details of the pattern were not reported. The mechanism that controls follicular dynamics during the estrous cycle needs to be better understood to optimize reproductive efficiency in buffaloes. The physiological control of recruitment, selection, growth, dominance and atresia of ovarian follicles is not well understood in buffaloes. The study of follicular dynamics during the estrous cycle will provide basis for improving fertility, synchronizing estrus with more precision and enhancing superovulatory response. The purpose of present study was to characterize the follicular growth and regression for an interovulatory interval and to correlate the pattern of follicular growth with plasma progesterone concentration.

## 2. Materials and methods

### 2.1. *Experimental animals*

Eight cyclic buffaloes of the Mehsana breed, 5–8 years of age and weighing 480–640 kg were selected at the Livestock Research Station, Dantiwada Agricultural University, Sardar Krushinagar, Gujarat for present study. These buffaloes were stall-fed and suckling was practiced prior to hand milking. The Livestock Research Station is located in north Gujarat at 24°19' latitude north and 72°19' longitude east at an elevation of 152.52 m above mean sea level. The climate of the region is tropical and semi-arid with moderate rainfall. The winters are extremely cold and dry, while summers are hot and dry. The experiment was conducted during the breeding season from September 2003 to January 2004 with average minimum and maximum ambient temperatures of 7.4–24.9 °C and 25.6–36.5 °C, respectively, and relative humidity from 66.0% to 93.3% in the morning and 16.4% to 61.3% in the evening. Each experimental animal was closely monitored for signs of behavioural estrus apart from heat detection being performed twice daily, each lasting for 1 h in the morning and the evening with a teaser buffalo bull. The buffaloes were considered in estrus only when they accepted bull mounting.

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