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Buffalo infertility: Challenges and its amelioration

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The world population of domestic water buffalo (*Bubalus bubalis*) is estimated to be approximately 172 million, of which 166 million (96%) are in Asia, and the remainder mainly in the Mediterranean and Latin American regions. The buffalo has been traditionally regarded as a poor breeder with low reproductive efficiency, characterized by late attainment of puberty and maturity, seasonality of calving, long postpartum anoestrus, poor expression of oestrous signs, low conception rates and long calving intervals. This can be attributed to factors such as harsh environments, lack of year round feed supply and minimal managerial inputs, in the majority of farming systems under which buffalo are raised. Studies have shown that they can have good fertility if they are managed and fed properly so as to overcome such stresses. Different studies have highlighted some of the reproductive characteristics of buffalo that have a bearing on their fertility and productivity and recent advances in modern reproductive technologies discussing the potential applications and limitations of these technologies for improving buffalo production. Anoestrus and repeat breeding are the major constraints due to huge economic losses encountered with 20-39% incidence of repeat breeding in buffalo and 80% of non-pregnant buffalo failing to exhibit estrus during summer season. The failure to detect estrus in a shy breeder like buffalo leads to temporary infertility. For the successful establishment of pregnancy, the prerequisites are accurate detection of estrus onset for predicting the correct time of Artificial Insemination (AI), pre-ovulatory follicular development and AI in stress-free environment, optimal duration of estrus, AI-ovulation synchrony, post-breeding luteal sufficiency and suppression of luteolytic signal. Various therapeutic and hormonal interventions acting at the level of pituitary or gonads have been tried for the fertility enhancement of dairy buffalo namely induction of oestrus and synchronized ovulation in anestrous buffalo, development of an estrus synchronization protocol for buffalo reared in hot and humid conditions, increasing pre-ovulatory follicle diameter, improvement in post-breeding luteal sufficiency and antiluteolytic strategies to establish pregnancy and endocrine strategies to normalize duration of estrus and establish pregnancy in repeat breeder buffaloes. Besides all these efforts, the success rate in problematic animals following application of these protocols is up to 50-60% (Ghuman 2013). Thus, interventions targeting central level may act in a more usual way to improve the function of pituitary and gonads. To further augment the reproductive efficiency of farm animals, the scientists are aiming at the hypothalamus, the black box. This warrants strategies in farm animals aiming at neuroendocrine control of GnRH and hence pituitary and gonadal axis.