

Urinary Peptides for Predicting Ovulation Period in Murrah Buffaloes: An Opinion

Opinion

In spite of buffalo's agro-economical importance, its reproductive efficiency is primarily compromised by poor estrus detection. Complications in predicting estrus and period of ovulation make it difficult to determine the optimal time for artificial insemination. This leads to reduced rate of conception, even with advanced assisted reproductive techniques, resulted in population decline and substantially reducing farmers' financial returns. Many tools have been developed to aid heat detection with high efficiency, nevertheless, it requires expert persons for precise interpretation, and are expensive for a marginal farmer to afford. An increased percentage of conception was observed by a cost-effective, comprehensible estrus prediction model [1], but this might better assist a valid biochemical parameter to increase the sensitivity of ovulation prediction. Though estrus-specific pheromones and proteins have been reported in buffaloes [2,3], no sensitive biochemical kit has yet been developed for estrus detection and/or ovulation period prediction.

Excretory fluids like urine reflect the internal status of the animal and have been proposed to be a better medium for assessing the reproductive status, non-invasively. Timed-artificial insemination by assessing urine for peptide hormones is in practice for many mammals. Luteinizing hormone (LH) is a heterodimeric glycoprotein, has an important role in ovulation, and its presence in urine is detected by its metabolite LH β -core fragment (LH β cf). The pattern of LH surge in buffalo urine was analysed and found that the extended LH surge window increases the success rate of prediction of ovulation period in this species [4]. In addition, an increased rate of conception was observed when inseminated artificially after positive-prediction of ovulation period through a cut-off LH value [5]. Though, efficacy of LH peptide based prediction method was evidenced, sensitivity of this method was limited by occurrence of multiple LH waves with different amplitudes, before and after the core pre-ovulatory LH surge [4].

Increasing the sensitivity of the prediction method is indispensable before the LH peptide is put forth for a portable kit development. In order to increase the sensitivity, certain valuable peptide markers in the same sample have to be identified and utilised. These markers should distinguish the period of ovulation from other phases of estrous cycle such as pre-estrus, estrus and post-estrus phases (Figure 1), where non-ovulatory LH surge and false prediction happens. Methods has to be put-forth for the effective extraction of proteins from buffalo urine and phase specific urinary proteins has to be documented through 2D Polyacrylamide gel followed by LC-MS/MS analysis. Ovulation prediction strip comprising antibodies for LH and phase specific proteins (separately) increases the sensitivity and reliability of the prediction of ovulation period, thereby achieves increased conception rate by determining precise time for artificial insemination.

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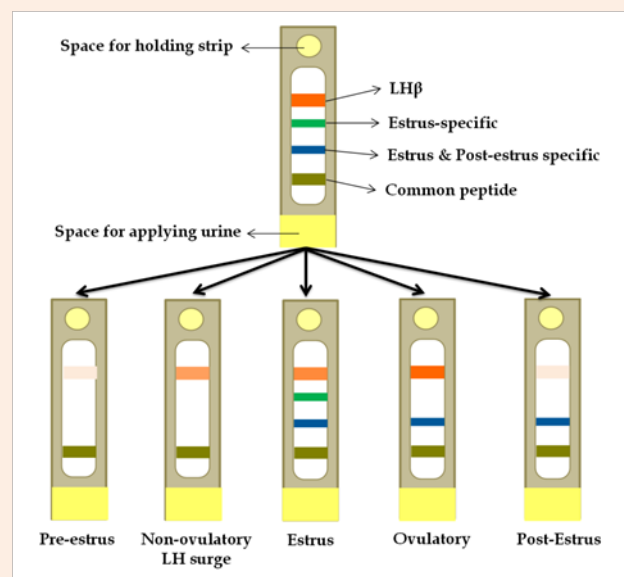


Figure 1: Representative banding pattern of dip-strips during different phases of estrous cycle.

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