EFFECT OF *AEGLE MARMELOS* AND *MURRAYA KOENIGII* ON ESTRUS INDUCTION, CONCEPTION AND CALVING RATE IN DELAYED PUBERTAL HEIFERS UNDER FIELD CONDITION

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Received: 03.05.2016 Accepted: 07.06.2016

ABSTRACT

Fertility response in delayed pubertal heifers (n=13) treated for 9 days with herbal blend of *Aegle marmelos* and *Murraya koenigii* leaf powder was evaluated in terms of estrus response, conception and calving rates in comparison to untreated controls (n=13). Following initiation of treatment, behavioral estrus was exhibited in 92.3% (12/13) heifers after 11.25±1.91 days. The conception and calving rates ($p<0.05$) in treated heifers were 61.5% and 53.8%, respectively, in comparison to 23.1% and 7.7% in their respective control counterparts. The current study revealed the pro-fertility potential of medicinal plants to induce fertile estrus in delayed pubertal heifers.

Keywords: *Aegle marmelos*, Delayed puberty, Estrus induction, Heifer, *Murraya koenigii*

INTRODUCTION

An early entry of heifers in the breeding stock is always beneficial in terms of their lifetime productivity. Despite the use of various hormonal and non-hormonal remedies to reduce the extent of loss rendered through poor reproductive efficiency in anestrus heifers (Lone *et al*., 2012), the condition still remained a frustrating challenge. Ethno-veterinary practices were paid little attention in the field of fertility improvement in the delayed pubertal heifers in India (Mehrotra *et al*., 2005; Satheshkumar and Punniamurthy, 2009 and Dutt *et al*., 2011). This is despite the fact that various Indian reports mentioned about the medicinal values of *Aegle marmelos* and *Murraya koenigii,* the plants rich in antioxidants, minerals (Co, Cu, Fe, I, Mn, Se, Zn) and vitamins (Vit A, B, C and E; Kumar and Singh, 2005; Morabad *et al*., 2009; Bhandari, 2012; Janarthanan *et al*., 2012 and Singh *et al*., 2012). Very recently, a promising estrus induction response with appreciable increase in the fertility was reported using the above herbs under farm condition (Das *et al.,* 2016). The present investigation details the fertility response including estrus induction, conception and calving rate in delayed pubertal heifers treated with *Aegle marmelos* and *Murraya koenigii* under field conditions.

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MATERIALS AND METHODS

The fresh green leaves of *Aegle marmelos* (Bel tree) and *Murraya koenigi (*Curry plant) were collected from the natural habitat and were shade dried followed by powdering in a mixer grinder and packaged in plastic bags at room temperature. Ethanolic extract (50%) of *A. marmelos* (Jondhale, 2007) and *M. koenigii* (Mehrotra, 2002) were effective (@1000 mg/kg body weight) in augmenting ovarian function in rats. The dose of extract for heifers was extrapolated from the rat by dose equivalent system, using Km factor (Van Miert, 1986). The dose of the extract was converted to the dose of leaf powder based on percent yield.

A total of 26 delayed pubertal heifers (age, 2-3.5 year, minimum body weight, 200 Kg) were selected from different rural pockets. The treatment group heifers (n=13) were fed calculated dose of herbal leaf

powder mixed in routine fodder for nine days (Dutt *et al*., 2011). The heifers responding to treatment were adjudged by exhibition of estrus with visual signs like vulvar edema, cervical mucus discharge, bellowing and drop in feed intake. The heifers exhibiting estrus were inseminated or mated as per the choice of farmer and pregnancy was confirmed by transrectal palpation after 2-3 months of breeding and the calving reports were recorded at term. The data was analyzed statistically by 2x2 contingency table using Yate's corrected Chi-square test since some cell frequencies were <5. Significance was set at 5% level.

RESULTS AND DISCUSSION

The supplementation of *A. marmelos* and *M. koenigii* leave powder induced behavioral estrus in higher percentage (92.3%) of delayed pubertal heifers within day 4-26 following start of treatment as compared to untreated heifers (46.2%; $p<0.05$). The mean interval between initiation of herb treatment and exhibition of behavioral estrus was 11.25±1.91 days. The conception rate was 61.5% in herb treated group, whereas the corresponding figure in untreated group was 23.1%. The number of services per conception and calving rate in treatment group was 1.75 and 53.8%, respectively. These outcomes corroborate with earlier studies in which *A. Marmelos* and *M. koenigii* treatment individually produced fertile estrus in anestrus goat, cattle and buffalo (Mehrotra *et al*., 2005; Kumar, 2008 and, Satheshkumar and Punniamurthy, 2009). Also, the effect of both the plants in combination was synergized to bring anestrous goat and buffalo into estrus (Dutt *et al*., 2010, 2011). The findings of present study revealed the stimulatory action of *A. marmelos* and *M. koenigii* combination on quiescent ovaries and thereby induced estrus in delayed pubertal heifers. Besides, the present findings also strengthen the similar estrus response (86.7-100%) reported in previous studies in delayed pubertal heifers under field condition (Anon, 2012-13). The active principles present in *A. marmelos* and *M. koenigii* have stimulatory effect on follicular dynamics, thus inducing estrus in anestrous buffalo (Dutt *et al*., 2011). Moreover, both the plants promote follicular development beyond 10 mm diameter in delayed pubertal heifers. Thus, the medicinal plant leaves have some active principles that promote the follicular development during the terminal growth stage particularly between dominance to pre-ovulatory stage resulting in behavioral estrus in the treated heifers.

In present study, the mean interval between the initiation of treatment to onset of estrus was 11.25±1.91 days which is comparatively longer than the interval reported earlier under field (8.75-9.84 d) and farm (6 d) conditions (Anon, 2012-13 and Das *et al*., 2016). An appreciable pregnancy rate of 61.5% was recorded in present study in treated heifers that responded to herb treatment under field conditions. Besides, satisfactory calving rate of 53.8% (treated basis) was also recorded in this study that was higher ($p<0.05$) than control 7.7%. The pregnancy and the calving rate of this study were also similar to the findings reported under farm condition (Das *et al*., 2016).

In brief, *A. marmelos* in combination with *M. koenigii* have the potential to induce estrus in delayed pubertal heifers along with a considerable pregnancy and calving rate under field condition. The study hopes to develop a cost effective therapy for inducing cyclicity and better fertility performance in delayed pubertal heifers.

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