



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2021; 10(3): 560-563
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www.thepharmajournal.com

Received: 25-01-2021
Accepted: 27-02-2021

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Treatment for augmenting fertility in heifers through ethnoveterinary practices

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Abstract

A wide variety of plant and plant based preparations have been used since long in veterinary medicine for therapy of many disorders and diseases. Many hormonal preparations have been tried on animals to restore the fertility whose results are suboptimal. According to the popular beliefs, ancient traditions and standard works by different workers, a number of plants or preparations have been mentioned as fertility modulator. Post treatment Conception percentage with one time EVM therapy was 40%. And with the second time EVM therapy Conception percentage was 100%. In this review we highlight the different combinations of ethno-veterinary medicines including plants and their products for enhancing the fertility with special reference to heifers.

Keywords: heifer, ethno-veterinary medicines, fertility

Introduction

Fertility management is a vital component in the dairy animals which has profound effect in determining profitability of a farm. This is influenced by the higher age at first calving, delayed estrus, variability of estrous length, genital prolapsed, dystocia, retention of fetal membrane, seasonality of calving, long post partum anestrous and subsequent calving interval. (Barile VL, *et al.*, 2005) [1].

Infertility poses serious economic losses to the farmers in terms of both low returns as a result of reduced milk production and increased veterinary expenses. Infertility occurs due to disruption of ovarian activity and estrus expression. The situation is exacerbated by negative energy balance during early lactation, delayed onset of estrus, delayed ovulation and fertilization failure. Culling rate in dairy animals is about 18-40 % per annum due to infertility or sterility in India. (Kaikini AS, 2002) [8]

Reproductive disorders adversely affect the reproductive efficiency. Infertility in dairy animals causes tremendous economic losses to the farmers and to the nation by decreasing milk yield, the number of calves produced and by increasing culling rate (Perumal *et al.* 2013) [13].

In cattle, female reproductive failure is assumed when animals do not become pregnant within the breeding season or do not maintain pregnancy to calving. (Bellows DS *et al.* 2002). Major female-related causes of reproductive failure include improper health, reproductive and nutritional management, reproductive disorders, and genetics. To mitigate some negative factors that impact reproduction, practices associated with cow herd nutrition, healthcare, and reproductive management have been established. (Bolormaa S *et al.* 2015) [2]

Heifer reproductive success in the first calving season is highly linked with lifetime reproductive efficiency. The proper selection and development of replacement heifers enhances the likelihood that heifers entering development programs will conceive early in the breeding season followed by increased stayability (Snelling WM, *et al.*, 1995) [17]. Management strategies aimed at increasing first breeding season reproductive success are discussed below, and many are targeted towards increasing the percentage of heifers reaching puberty before the start of the breeding season. Such practices include the selection of older and heavier heifers at weaning (Funston RN, *et al.*, 2012) [5] nutritional management of heifers to reach a defined percentage of their mature bodyweight by the start of the breeding season, reproductive tract scoring to screen heifers for puberty ~ 30 d before the start of the breeding season, the implementation of a progestin-based estrous synchronization protocol (Patterson DJ *et al.*, 2013) [14] and the incorporation of expected progeny differences (EPDs) to select heifers with increased genetic merit for fertility.

Age of heifers

The selection of replacement heifers that are born early in the calving season is an essential step to optimizing overall reproductive success. It is expected that early born heifers will enter the breeding season with increased morphological and physiological maturity than their younger herd mates.

Nutritional management of heifers

Appropriate nutritional status is essential for reproductive success in cattle. Energy restriction delays the ever critical onset of puberty in beef replacement heifers. Furthermore, inadequate energy consumption, as exhibited by low body condition score, reduces pregnancy success in beef cows throughout their productive lifespan. By contrast, heifers experiencing higher levels of nutrition and adequate weight gain prior to the first breeding season experience increased reproductive success in their first and subsequent calving seasons (Fleck AT *et al.*, 1980 and Milagres JC, *et al.* 1979) [4, 9]. To this end, heifer development programs have been established for beef cattle producers to provide adequate nutrition for heifers to attain puberty and high reproductive success in their first breeding season. Cattle farms in different regions have varied sources of nutrients available for heifer development, and these feedstuffs have seasonal availability. Thus, the impact of the timing of weight gain on first breeding season pregnancy outcome has been evaluated.

The genetic basis of heifer fertility

Genetic selection is used to improve beef cattle populations for many production related traits. Relatively fast genetic progress can be achieved with traits such as growth rate and carcass quality because of their moderate to high heritability [Torres-Vázquez JA *et al.*, 2018,] [18]. By contrast, the heritability of traits directly related to female reproduction is lower, and thus the rate of genetic change in fertility traits based upon genetic selection is much slower relative to growth and carcass traits. Despite low heritability, models are being developed utilizing genetic parameters to select beef cattle for the improvement of heifer fertility.

Pregnancy rate is a common trait utilized when evaluating fertility. Interestingly, the genetic correlation between yearling pregnancy rate and lifetime pregnancy rate is high, namely 0.92–0.97 [Mwansa PB, *et al.*, 2000] [11]. These findings support a genetic link between reproductive success in the first breeding season and productive lifespan.

Regulate Reproductive Cycle

Estrous cycles consist of a series of predictable reproductive events at estrus (heat) and ending the subsequent estrus. They continue throughout the adult female's life and are interrupted by pregnancy, nursing and by season of the year in some species. Cyclicity may also cease if nutrition is inadequate or environmental conditions are unusually stressful. For that, the farmers used some herbal preparation and gave it along with daily ration to their animals.

Anoestrus

Failure of estrus or anestrus, in cattle is the principal symptom of many conditions that may affect the estrous cycle. It is the most common single cause for infertility in cattle. Anestrus in cattle is observed most commonly either after parturition as postpartum or preservice anestrus or following service as postservice anestrus, when conception does not occur. In heifer, it is frequently observed as a herd problem especially

during periods of lowered nutritive intake. The herbal remedial measure practiced by the villagers includes grinding the plants *Tinospora cordifolia* locally known as Saguni lota, along with the bark of *Cassia fistula* L. locally known as Sonaru and leaves of *Artocarpus heterophyllus* L. locally known as kothal and fed to the animal orally for a period of 3-4 days.

Supplementation of *Trigonella foenum-graecum* (*Fenugreek*) powder can solve anestrus problem in cow (Mishra BP, *et al.*, 2002) [10]

Traditional knowledge on augmenting fertility in heifers

Reproductive problem in animals are mainly silent heat, delayed heat, anestrus, retained fetal membrane and uterine infection which occur after calving, because these period is crucial for the bovine life when various physiological, gynecological, biochemical changes occur and animals is exposed to high risk of infection to uterus because genitalia remains open for various days (Goff JP & Hrst RL *et al.*, 1997) which leads to loss of milk production, late first heat, delayed conception rate, early embryonic mortality then finally animals become a repeat breeder even permanently infertility (Narasimhan KS & Deopurkar VL *et al.*, 1994) [12]. Irrational use of antibiotics for treatment of reproductive problem has lead to emergence of resistance strains. (Hemaiswarya S, *et al.*, 2008) [7]

Based on the finding of above, now moving towards the use of the herbal preparation to overcome the reproductive problem. Plants used to treat the animals from thousands of years. Plant based drug may be used directly that they may be collected dried and their active ingredients separated by various chemical process which are employed as medicines. The active ingredients of plants may be glycosides, lipids, tannins and alkaloids. (Ramachandran K *et al.*, 1990) [15]. World Health Organisation (WHO) has also recommended the promotion of Ethnoveterinary practices and conservation and cultivation of medicinal plants. (Dalal KC *et al.*, 1992) [3]. The traditional knowledge of local healers who possess knowledge and experience in traditional systems of treatment is important, but their knowledge regarding the treatment practices have not documented and is vanishing very rapidly (Romha *et al.* 2015) [6]. Many medicinal plants have been claimed to be effective in modulating reproduction but the systematic scientific evidence regarding their mechanism of action, dosage or clinical efficacy is lacking. Incorporation of cheap, efficacious and scientifically proven indigenous plant based medicines is the need of the hour along with establishment of their safety needs.

It is becoming increasingly evident that many herbal preparations are indeed of considerable value and needs for scientific validation. Since proving use of this herbal preparation, i.e. practices by the local and tribal community, but these preparations got very little attention in the present system for the treatment of various reproductive problems in farm.

Methodology

In TANUVAS –RREC, a well maintained demo unit of cattle unit is maintaining for demonstrating and research purpose.all the cattles were maintained with balanced nutrition of 25-35 kg of green fodder like Co-4, Co-5,velimasal, fodder cow pea and dry fodder of paddy straw 5 kg and concentrates feed of 3-4 kg fed regularly. In this five heifers were attained sexual maturity but not to conceive even after 5 to 6 times of

artificial insemination. Treatment of uterus cleansing, estrous synchronization and hormonal therapy also followed and failure to conception. Deworming also done regularly after the faecal examination. In this study, to enhance the fertility in heifers ethno veterinary practices were followed.

Five heifers were selected from dairy unit of TANUVAS-RREC, Pudukkottai and EVM therapy of herbal formulation

comprising (oral administration of *Raphanus sativus* for first 5 days, *Aloe vera* for next four days, *Moringa oleifera* for next four days, *Cissus quadrangularis* for next four days and *Azadirachta indica* leaves with *curcuma longa* for last four days) for 21 days were followed based on TANUVAS, TDU and NDDDB for enhancing fertility in dairy animals.



Fig 1: Aloe vera mixing in feed



Fig 2: Aloe vera mixed concentrate feed



Fig 4: oral administration of herbal paste to heifer



Fig 3: Herbal ingredients fed to heifer



Fig 5: Checking the animal status

Results

Post treatment Conception percentage with one time EVM

therapy was 40%. and with the second time EVM therapy Conception percentage was 100%.

Table 2: The Conception percentage after EVM therapy to augment infertility in heifers

Sl no	Heifer no.	No. of times Artificial insemination before treatment	Conception at the first duration of treatment		Conception at the second duration of treatment		Conception percentage	
			No. of times Artificial insemination after treatment	Positive or negative pregnancy rate after first treatment	No. of times Artificial insemination after second treatment	Positive or negative pregnancy rate after second treatment	Conception percentage after first treatment	Conception percentage after second treatment
1.	C1	4	1	+	-	-	40%	60%
2.	C3	4	1	-	1	+		
3.	C4	5	1	-	2	+		
4.	C5	3	1	+	-	-		
5.	C6	4	1	-	1	+		

Conclusion

The findings of the present study placed on record the evidence based evaluation of a successful EVM formulation comprising (oral administration of *Raphanus sativus* for first 5 days, *Aloe vera* for next four days, *Moringa oleifera* for next four days, *Cissus quadrangularis* for next four days and *Azadirachta indica* leaves with *curcuma longa* for last four days) for augmenting fertility in heifers. The information collected from the available literature on the fertility enhancing properties substantiate the rationality of the combination. The phytochemical analysis of the formulation, revealed the presence of compounds possessing these activities which justifies its use in augmenting fertility under field conditions. Hence, it may be assumed that the EVM therapy is highly effective in enhancing the fertility in heifers.

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