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Use of ethno-veterinary medicine for therapy of reproductive disorders in cattle

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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 infertile 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. In this review we highlight the different combinations of ethno-veterinary medicines including plants and their products for amelioration of different reproductive disorders in animals with special reference to dairy cows. More appreciation and systematic work on the plant based remedies is required to prove their value and efficiency to treat reproductive disorders. It is becoming increasingly evident that many herbal remedies are indeed of considerable medicinal value and need fullest exploitation.

Keywords: Plant, plant based preparation, veterinary medicine, ethno-veterinary medicine, reproductive disorders

1. Introduction

The success of dairy cattle and buffalo husbandry lies in ensuring proper and optimal reproductive rhythm of each individual female in the herd. Infertility in dairy animals causes tremendous economic losses to the farmers by decreasing milk yield, the number of calves produced and by increasing culling rate (Perumal *et al.*, 2013) ^[1]. It is estimated that around 18-40% cattle are culled per annum due to infertility or sterility in India (Kaikini, 2002) ^[2]. Considerable attention has been focused on reproductive endocrinology for the last 2 to 3 decades as a means to identify specific problems and to adopt therapeutic measures by using exogenous endocrine substitutes (hormones and their analogues) for augmenting fertility in farm animals (Hukeri, 1995) ^[3]. Many hormonal preparations like GnRH, eCG, and progesterone alone or in combination have been tried on infertile animals to restore the fertility of dairy animals, but the results of hormonal treatments for infertility are suboptimal (Perumal *et al.*, 2013) ^[1]. The major constraints in the use of various hormonal preparations are high cost and non availability of commercial preparations with ease at many locations (Kaikini, 1989) ^[4]. Indiscriminate use of antibiotics for treatment of uterine infections has led to emergence of resistance strains (Perumal *et al.*, 2013) ^[1]. As a result of this the attention is now moving towards the herbal formulations (Hemaiswarya *et al.*, 2008) ^[5]. Medicinal plants and reproductive use of certain plants and their preparations in fertility regulation particularly as emmenagogue and for various other reproductive ailments is very well documented in human ayurvedic therapy (Perumal *et al.*, 2013) ^[1]. A number of plants or preparations have been mentioned as fertility modulator according to popular beliefs, ancient traditions and standard works by different workers (Perumal *et al.*, 2013) ^[1]. Although scientific work on the active principle, absorption and clearance, dose, side effects etc for most herbal medicines is meager however, World Health Organization has also recommended the promotion of native practices and conservation and cultivation of medicinal plants (Dalal, 1992) ^[6]. The alternative medicines, in particular, herbs can play an effective role in efficient reproductive management and successful rearing of our animals.

It is therefore necessary to focus on alternative management interventions that are less expensive, safe, widely applicable, and sustainable in the developing world to enhance animal productivity so as to improve the livelihood of animal producers. In this chapter, the use of various ethno-veterinary medicines for the therapy of reproductive disorders in cattle is discussed.

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2. Reproductive disorders in cattle

Reproductive indices that are used to assess reproductive management show a negative trend during the past decade despite increased knowledge and professional attention (Kumar *et al.*, 2010) [7]. Poor detection of estrus is the major contributor to low fertility (Reimers *et al.*, 1985) [8]. Until recently, it was generally believed that poor detection of estrus was caused by the lack of commitment of the farmer (Alexander *et al.*, 1984) [9]. However, reports (Dransfield *et al.*, 1998; Stevenson *et al.*, 1998; van *et al.*, 1996) [10-12] showed that cow related factors contribute largely to the low detection rates. In recent years, there has been growing interest in improving reproductive performance by feeding nutritional supplements to dairy cows.

Production and reproduction disorders and veterinary costs are more associated with the postpartum period. Post partum period is the most crucial transitory phase in cows when various physiological, gynaecological and biochemical changes occur (Perumal *et al.*, 2013) [1]. During this period cattle are exposed to high risk of infection to uterus as the anatomical barriers are relaxed and genitalia remains open for some days (Goff and Horst, 1997) [13]. On account of conditions such as retained foetal membranes, uterine infections during this crucial post partum period, there is reduced milk production, delay in involution of uterus and subsequent delayed conception, (Sandals *et al.*, 1979; Satya pal, 2003; and Balasundaram, 2008) [14-16] early embryonic mortality and the problems of repeat breeding or rarely permanent infertility (Narasimhan and Deopurkar, 1994) [17]. Retention of fetal membranes is one of the most common problems during the post partum period in cattle. It can lead not only to persistence of putrefying tissue but also to increased incidence of metritis, decreased milk yield and poor fertility (Laven and Peters, 1996) [18]. Similarly metritis and endometritis are other uterine diseases that incur losses to the farmers.

Anestrus is defined as a prolonged period of sexual quiescence. It may be physiological (pubertal, a short interval post partum or during pregnancy) or pathological where the ovaries may either be quiescent (true anoestrus) or may contain a progesterone secreting luteal tissue due to some uterine pathology. Various methods for management of true anoestrus through alternative medicines have been suggested (Perumal *et al.*, 2013) [1]. Supplementation of anti-oxidant and

immunomodulator agent during transition period has been reported to be resulting in early onset of postpartum estrus and improved pregnancy rate (Khan, 2008) [19].

3. Plant based Ethnoveterinary drugs

Plants are the most commonly used ingredients in the preparation of ethnoveterinary medicines in the treatment of animals since ancient time. All parts of the plants, including leaves, bark, fruits, flowers, seeds are used in medicinal preparations. Plant based drug (natural drugs) may be used directly that they may be collected dried and used as a therapeutic agent (crude drugs) or their active principles, separated by various chemical process which are employed as medicines (Perumal *et al.*, 2013) [1]. The active principles of plants may be carbohydrates, glycosides, tannins, lipids and alkaloids (Ramachandran and Mehtani, 1990) [20]. So far, more than 100,000 biologically active secondary plant compounds have been isolated from higher plants, these diverse structures falling into four main chemical classes. The phenolics (phenols, flavonoids, quinones, tannins and lignins), terpenoids (monoterpenes, lactones, diterpenes, saponins and others), sulphur compounds (glucosilates, disulphides and acetylenic thiophenes) and nitrogen compounds (alkaloids, amines, non-protein amino acids and cyanogenetic glycosides) (Perumal *et al.*, 2013) [1]. Certain organic acids and polyacetylenes are also known to exist (Cotton, 1996) [21]. More appreciation and systematic work on the plant based remedies is required to prove their value and efficiency to treat reproductive disorders. It is becoming increasingly evident that many herbal remedies are indeed of considerable medicinal value and need fullest exploitation. Despite these facts, very little attention has been given to systematically describe and explore the traditional herbal medicines used by the local and tribal communities in specific areas for the control and treatment of various reproductive disorders in farm animals (Perumal *et al.*, 2013) [1].

4. Plant preparations used for reproductive disorders

A wide range of medicinal plants and their preparations have been found to be useful in treatment of reproductive disorders and other related reproductive ailments (Table 1). Chinese workers have mentioned the use of herbs for infertility treatment in cows (Table 2) and similar descriptions are available for Nigeria (Table 3 and 4).

Table 1: Plants used for therapy of bovine reproductive disorders (Nadkarni, 1954) [22].

S. No.	Plants Botanical Name	Disorder
1	<i>Entada pursoetha</i>	uterine disorders
2	<i>Myrtus communis</i>	Prolapse of uterus
3	<i>Nigella sativa, Pedalium murex</i>	puerperal and uterine diseases
4	<i>Pandanus odoratissimus</i>	sterility and threatened abortion
5	<i>Plantgo species</i>	postpartum complaints
6	<i>Viburnum foetidum</i>	post partum haemorrhage, threatened abortion
7	<i>Viola species</i>	uterine prolapse

Table 2: Chinese herbal medicines used for bovine infertility.

S. No.	Herbal medicine composition	Forms	Application	Efficacy	References
1.	<i>Morinda officinalis</i> , Safflower, Cowherb seed <i>Herba epimedii</i> , <i>Fructus psoraleae</i> <i>Semen cuscuteae</i> , Kudzu vine root	Powder	300g per cow, oral administration per day for 8 days, then withdraw for 5 days, subsequently 250g for additional 8 days	90% recovery	He <i>et al.</i> , (2012) [23]
2	Chinese dodder seed <i>Epimedium Herba houttuyniae</i>	Perfusion liquid	50 ml for uterine infusion once every 2 days, lasting for 6 days	66.6% efficacy and 50% pregnancy	An <i>et al.</i> , (2012) [24]
3.	<i>Epimedium</i> , <i>Actinolite</i> , <i>Astragalus membranaceus</i> <i>Ligusticum wallichii</i> , <i>Semen allii tuberosi</i>	Decoction	One dose, orally for 15 days	90% recovery and 77.8% pregnancy	Liu <i>et al.</i> , (2013) [25]
4.	Common cnidium fruit Lightyellow sophora root Rhizome of Chinese goldthread, Licorice	Perfusion liquid	50ml once every 2 days, for 5 days occasions	Cure rate of 8 cows was 100% in a week	Cong <i>et al.</i> , (2015) [26]
5	<i>Radix salviae miltiorrhizae</i> , <i>Rhizoma ligustici wallichii</i> , Rhizome of rehmannia, Root of rehmannia, <i>Radix paeoniae alba</i> , <i>Motherwort</i>	Powder	One dose, orally daily for 3 days	77.8% efficacy	Fan <i>et al.</i> , (2011) [27]
6	Deer horn glue <i>Morinda officinalis</i> , <i>Angelica Liquorice</i>	Decoction	1-3 days after the end of the estrus cycle. One dose per cow, orally administration, twice a day for 3 days	88.9% efficacy	Liu <i>et al.</i> , (2014) [28]

Table 3: Infertility problems of animals in northern Nigeria and their local remedies (Alwa *et al.*, 2002) [29].

Ailment	Plants/primary ingredients	Method of preparation/ingredients	Mode of application
Infertility	<i>G. senegalensis</i> Lam	Grind dry bark and add water	Give orally about 20 centi litre (cl) one to two times daily
	<i>G. senegalensis</i> Linn	Squash apical part including buds and leaves and add water	Give orally 15 centi litre (cl) one to two times daily
	<i>K. senegalensis</i> , A. Juss	Soak ground bark in water	Give orally 10 centi litre (cl) of solution once daily
	<i>M. balsamia</i> Linn	Squash fresh leaves and soak in water	Give orally about 10 centi litre (cl) of solution one to two times daily
	Local potassium and kaolin: Potassium salt and kaolin are unrefined types obtained by excavation of areas around river banks and streams during the dry season.	Wholesome used	Give as lick
	<i>Striga hermontheca</i> <i>Del. Benth</i>	Squash fresh whole aerial of plant and soak in water	Give orally about 10 centi litre (cl) of solution two to three times daily
	<i>Tamarindus indica</i> Linn.	Squash whole aerial part of plant and soak in water	Give orally 15 centi litre (cl) of solution two to three times daily

Table 4: Retained placenta problems of animals in northern Nigeria and their local remedies (Alwa *et al.*, 2002) [29].

Ailment	Plants/primary ingredients	Method of preparation/ingredients	Mode of application
Retained placenta	<i>Balanites aegyptica</i> Del.	Soak fresh leaves in water with leaves of <i>T. indica</i> for about one day	Give orally about 15 centi litre (cl) of solution or give fresh leaves to animal to eat
	<i>Ficus thonningii</i> Blume	Fresh leaves	Give fresh leaves to animal to eat
	<i>Hibiscus sabdariffa</i> Linn	Apical part of plant	Feed to animal
	<i>S. bicolor</i> , Linn. Moench	Apical part of plant	Feed to animal
	Wood ash	Ash powder	Rub ash powder around vagina to induce placenta expulsion

4.1 Plants used for Anestrus

4.1.1 Fenugreek (*Trigonella foenum-graecum*)

Fenugreek (Methi in Hindi) is a 30-60 cm tall, annual aromatic leguminous plant of the Fabaceae family cultivated world wide as a semi arid crop. It is indigenous to the countries bordering the eastern shores of the Mediterranean, extending to central Asia. The name fenugreek is from Latin for "Greek hay". Fenugreek seeds are carminative, mucilaginous, demulcent and diuretic, also tonic emmenagogue, emmollient, aphrodisiac and galactagogue (Singh and Pandra, 2005) [30]. Fenugreek seed is often

encountered in the cuisine of the Indian subcontinent.

In some parts of India, feeding fenugreek or jiggery in limited quantities to lactating buffaloes during early lactation is part of the traditional feeding practice (Lall *et al.*, 1996) [31]. Fenugreek oil stimulates ovarian activity (Hassan *et al.*, 2006) [32] and seeds of fenugreek have an activating effect on the oviduct (Balash and Al-Quyem, 2003) [33]. It is hence believed that fenugreek seeds have the potential to enhance animal performance through their active ingredients such as saponins and alkaloids (Ahmed, 2009) [34]. Tomar (1995) [35] reported that supplementation of indigenous feeds which included

fenugreek (maithy) seeds resulted in higher reproductive performances and it was suggested that those results could be due to higher content of minerals (major minerals like iron, calcium and phosphorus; trace minerals like copper manganese and zinc). Berhane (2000) [36] reported that highest reproductive performances (onset of estrus, pregnancy rate) were recorded in dairy cows supplemented with gur, linseed oil and maithy (fenugreek) mixtures. Rajkumar *et al.*, (2008) [37] studied the effect of *Saraca asoca* stem bark and *Trigonella foenum-graecum* seeds on reproductive performance, serum progesterone and micro minerals profile in anestrus cows and reported that the percentage of animals induced to oestrus and overall pregnancy rate using fenugreek seeds were higher. Supplementation of FSP (Fenugreek seeds) @ 1 g/kg BW improved reproductive performance and economics of milk production of dairy goats (Ahmed, 2009) [34].

4.1.2 *Asparagus racemosus* (Shatavari)

Asparagus racemosus root is the most commonly used traditional medicine in human beings and its supplementation is recommended during last trimester of pregnancy to first trimester after birth to the mother to boost milk quality, immunity of both mother and fetus and to tone the reproductive system and reproductive health (Kumar *et al.*, 2010) [7]. The reported earlier first postpartum estrus in supplemented groups could be due to estrogenic property of *Asparagus racemosus* which might have stimulated the ovarian function and uterine tonicity properties of *Asparagus racemosus* that could have helped in early uterine involution and consequently early initiation of estrous cycle in supplemented groups (Pandey *et al.*, 2005; Sebastian, 2006;

Kumar *et al.*, 2010) [38, 39, 7]. The improvement in supplemented group prepartum and post partum period could be due to antioxytotic action of *Asparagus racemosus* compound (present in *Asparagus racemosus*) on uterus, which helps in conception (Gaitonde and Jetmalani, 1969) [40]. Mitra *et al* (1999) [41] also reported that *Asparagus racemosus* based herbal formulation did not possess oxytocin like activity which might be useful in condition associated with hypermotility of uterus as in threatened abortion, hence *Asparagus racemosus* supplementation enhances conception. Further, Kumar and Singh (2001) [42] reported that administration of *Asparagus racemosus* based herbal formulation increases the thyroxin stimulating hormone, follicle stimulating hormone and luteinizing hormone, which help in regular ovulation and improved conception rate in infertile women.

Besides, *Asparagus racemosus* have been scientifically validated as reproductive system tonic, immunomodulator, antioxidant, and anti-stress agent (Kumar *et al.*, 2008) [43]. Keeping in view these benefits, Kumar *et al.*, (2010) [7] in his studies used supplementation of *Asparagus racemosus* herb as supportive management intervention to improve the reproductive performance in Karan Fries dairy cows. Supplementation of root powder of *Asparagus racemosus*, (PREPOS) prepartum for 50 to 60 days @100mg/kg body weight continued postpartum (90 days) @200mg/kg body weight improved estrus behavior in treated cows. Probably due to estrogenic properties of *Asparagus racemosus*. Different parts of plants have been suggested in many studies to induce estrus in anestrus cows (Table 5).

Table 5: Plants used to induce follicle growth and estrus in cows.

S. No.	Plants	Parts	References
1	<i>Aloes barbadensis</i>	Whole plant	Jayakumar (1997) [44]
2	<i>Aristolochia bracteata</i>	Whole plant	
3	<i>Abroma augusta</i>	Root	Kabir <i>et al.</i> , (2001) [45]
4	<i>Nigella sativa</i>	Seed	
5	<i>Murraya koenigii</i> and	leaf	Mehrotra (2002) [46]
6	<i>Urtica dioica</i>	Root	
7	<i>Trigonella foenumgraecum</i> at the dose rate of 200 g day and <i>Saraca asoca</i> at the dose rate of 50 g day	Whole plant	Rajkumar (2004) [47]
8	papaya (<i>Carica papaya</i>)	Unripe fruit	Nayak, (1995) [48]
9	Cucumber	leaves	Chander and Mukherjee, (1994) [49]
10	<i>Aegele marmelos</i>	bili leaves	Koradia, (1995) [50]
11	<i>Leptadenia reticulata</i>	Whole plant	
12	<i>Asparagus racemosus</i>	Whole plant	Gupta, (1993) [51]
13	bamboo	leaves	
14	jute plant	Leaves (about 2-2.5 kg)	
15	Mann tree	Leaves (15-20 kg)	Parmar, (1998) [52]
16	Dudheli (<i>Pergularia daemia</i>)	Pods	
17	bhilama (<i>Semecarpus anacardium</i>)	seeds	Bechardas, (1992) [53]
18	<i>Trichoxanthus tricuspidata</i>	boiled unripe fruits	Gaur <i>et al.</i> (1992) [54]
19	<i>Potentilla fulgens</i>	entire plant	
20	<i>Murraya koenigii</i>	Leaf paste	Sudarsanam <i>et al.</i> , (1995) [55]
21	<i>Hybanthus enneaspermum</i>	Plant paste	
22	<i>Echinops echinatus</i>	plant paste	Reddy and Sudarsanam, (1987) [56]
23	<i>Bridelia ferrugiana</i> of Euphorbiaceae family	Whole plant	Ngeh <i>et al.</i> , (1995) [57]
24	Plant <i>Ficus elastica</i> of Moraceae family	Whole plant	
25	Plant <i>Gardenia ternifolia</i> of Rubiaceae family	Whole plant	

4.2 Different combination of plant extracts with other ingredients suggested for anestrus

A leaves of silk cotton tree are powdered together with fermented boiled rice water and the extract is administered to cows orally as a remedy for reproductive problems.

Approximately 500 ml of the prepared constituents given, three times a day for 3 consecutive days were suggested (Ranjan and Sethuraman, 1997) [58]. One study suggest the oral feeding of 200 g of germinated Bengal gram (*Cicer arietinum*) continuously for one week. After a week, the

heifer will show heat symptoms (Perumal *et al.*, 2013) [1]. Slightly better results were observed when the above feeding was combined with pounded leaves and unripe fruit of yaanai nerungi (*Pedaliium murex*) may be given once a day for three days without adding water (Perumal *et al.*, 2013) [1]. Similarly oral feeding of 200 g of germinated horse gram continuously for one week were suggested for anestrus treatment of cows (Balasundaram, 1998b) [59].

4.3 Different combination of plant extracts with other ingredients suggested for conception improvement and repeat breeding

Conception rate can be improved in cows and buffaloes by feeding medicines prepared by mixing and powdering of herbs like *Tinospora cordifolia*, *Cassia fistula*, jack fruit (tender leaves), *Plumbago zeylanica* (root), *Clerodendrum inermis* (leaves) (Honnegowda, 2000) [60].

Whole plant of *Hydrilla verticillata*, seed of *Lens culinaris subsp. culinaris*, *Myristica fragrans*, *Ricinus communis*, *Triti-*

cum aestivum and flower of *Pandanus tectorius* are given to both female and male to increase the conception rate (Kumar and Kumar, 2013) [61].

Medicinal plants such as *Lawsonia inermis*(leaves), *Musa paradisiaca*(leaf extract), *Cordial sp* (leaves), *Convolvul microphyllus*(roots), *Cicer arietinum* (germinated Bengal gram), *Pedaliium murex*(fruits) are effectively used for treatment of repeat breeder cows (Das *et al.*, 2002) [62].

4.4 Plants Used for Retained Placenta

A wide variety of Chinese plant species have been reported by Nu people for the treatment of livestock diseases such as removal of afterbirth in Gongshan County (Table 6). Besides these, other plants have also been reported to be of value in therapy of retained placenta in cattle (Table 7). Studies in India and other places have also shown the worth of using whole plant or their parts in treating retained placenta of cows (Table 8).

Table 6: Traditional Chinese medicine prescription against retained placenta

Composition	Form	Usages	Efficacy	References
<i>Angelica, Talcum, Rehmannia root, Radix astragali, Tuckahoe, Peach kernel, Motherwort, Radix codonopsitis Safflower, Licorice</i>	Decoction	Oral administration one decoction per day	95% success 12h post administration	Chen <i>et al.</i> , (2015) [63]
<i>Angelica, Wallichii, Garden balsam, Rhizoma ligustici, Radix codonopsitis, Motherwort</i>	Perfusion	Rectal perfusion with 150 ml/per time	97.8% cure rate and average dosing time was 2.6 times	Li <i>et al.</i> , (2015) [64]
<i>Herba Leonuri, Angelicae Sinensis Radix, Flos Carthami, Myrrha, Rhizoma Cyperi</i>	Tincture	Oral administration per day, 0.45g herb/kg BW	73.1% success within 72 h	Cui <i>et al.</i> , (2014) [65]
<i>Fructus meliae toosendan, Radix bupleuri, Semen litchi, Fennel Frankincense Notopterygium root</i>	Decoction	0.4g crude herb/kg BW fed directly or put into the feed, twice a day	95% recovery within 4~20 days	Lv <i>et al.</i> , (2014) [66]
<i>Garden balsam, Motherwort, Dried ginger Angelica, Peach kernel Safflower, Myrrh Rhizoma cyperi</i>	Tincture	1 ml tincture/ kg BW. orally, once or twice	84.4% cows expelled placenta within 48 h	Cui <i>et al.</i> , (2013) [67]
<i>Motherwort, Chinese angelica, Chuanxiong, Semen persicae, Dry ginger Licorice</i>	Powder	250g per cow, orally administration with warm water, once a day, lasting for 3~5 days	Satisfactory results	Zhou <i>et al.</i> , (2010) [68]
<i>Dang Hong Fu</i>	Injection	40 ml extracts or 40g herbs, injected into uterus	83.3% recovery in retained placenta cases.	Luo <i>et al.</i> , (2010) [69]

Table 7: Parts of different plants used in therapy of retained placenta of cattle.

S. No.	Plants	Family	Parts	References
1	<i>Agrimonia pilosa</i> Ldb	Rosaceae	Roots	Shen <i>et al.</i> , (2010) [70]
2	<i>Epilobium brevifolium</i> D. Do	Onagraceae	Roots	
3	<i>Hemiphragma heterophyllum</i> Wall.	Scrophulariaceae	Whole plants	
4	<i>Impatiens lecomtei</i> Hook. f	Balsaminaceae	Whole plants	
5	<i>Kadsura interior</i> A. C. Smith	Magnoliaceae	Roots and stems	
6	<i>Leonurus artemisia</i> (Laur.) S. Y. H	Labiatae	Whole plants	
7	<i>Polygonum paleaceum</i> Wall	Polygonaceae	Rhizomes	
8	<i>Rubus corchorifolius</i> L. f.	Rosaceae	Whole plants	
9	<i>Sinodielsia yunnanensis</i> Wolff	Umbelliferae	Roots	
10	<i>Spinacia oleracea</i> L	Chenopodiaceae	Whole plants	
11	<i>Verbena officinalis</i> Linn.	Verbenaceae	Whole plants	

Table 8 Plants used for Retention of placenta.

S. No.	Plants	Parts	References
1	Bamboo leaves and bark are boiled with paddy husk	Leaves and bark	Verma, (1998) [71]
2	<i>Ficus benghalensis</i>	Whole plant	Vale, (1994) [72]
3	ber (<i>Zyzyphus mauritiana</i>)	Leaves and twigs	Baraiya, (1994) [73]
4	jingara	leaves	Rabari, (1994) [74]
5	cotton plant	Cotton shells and roots	Darbar, (1993) [75]
6	<i>Legernaria vulgaris</i> (ruraikai)	Whole plant	Balasundaram, (1998a) [76]
7	tassles of 20-25 maize cobs are boiled in water	Tassles	Baraiya, (1994) [73]
8	1 litre of sugarcane leaf juice	Leaves	Ninama, (1999) [77]
9	<i>Abrus precatorius</i>	Whole plant	Singh and Khan, (1999) [78]
10	<i>Abutilon indicum</i>	Whole plant	Ali Sagar <i>et al.</i> , (2003) [79]
11	<i>Anethum suva</i>	Whole plant	
12	<i>Ficus glomerata</i>	Whole plant	
13	<i>Caesalpinia bonducella</i> (kanarej)	Root bark	
14	Raspberry	leaves	Perumal <i>et al.</i> , (2013) [1].
15	Garlic	Whole plant	Ali, (1999) [80]
16	Thyme (<i>Thymus sepillum</i>)	Whole plant	
17	starwort (Helonias root)	Whole plant	
18	<i>Ludwigia octovalvis</i>	Whole plant	
19	<i>Acacia nilotica subsp. Indica</i>	Gum	Kumar and Kumar, (2013) [61]
20	<i>Basella alba</i>	Leaf paste	Ali, (1999) [80]
21	<i>Boerhavia diffusa</i>	Whole plant	
22	<i>Oxalis corniculata</i> and <i>Centella asiatica</i>	Whole plant	
23	<i>Brassica napus</i>	Seed oil	
24	<i>Corchorus capsularis</i>	Dried flower	
25	<i>Ficus benghalensis</i>	roots	
26	<i>Ziziphus mauritiana</i>	roots	
27	<i>Mimosa pudica</i>	Leaves	
28	<i>Musa paradisiaca</i>	Leaves	
29	<i>Saccharum spontaneum</i>	Leaves	
30	<i>Kigelia Africana</i> plant of Bignoniaceae family	Whole plant	
31	<i>Pouzolzia hypoleuca</i>	Fresh leaves	Maroyi, (2012) [81]

4.5 Combination of plant extracts with other ingredients suggested for Retained placenta

A combination suggested for easy expulsion of bovine placenta include 2 kg pearl millet (*Pennisetum americanum*) grain, 100g of methi (*Trigonella foenum-graecum*) seeds, 50 g of asalio (*Lepidium sativum*), 25 g of suva (*Anethum graveolens*) and 500 g of jaggery. The combination is boiled in water for one hour. The cooked feed (after cooling) is fed to cow or buffalo after delivery. The placenta expels out within 2-3 hrs after this treatment (Vaghasiya, 2001) [82]

Kheem (*Leptadenia pyrotechnica*) root, chirmi (*Abrus precatorius*), chopped bamboo leaves or sticks and decoction prepared with black pepper, coriander, ajwain, sonth and methi have also been used as cleansing drought by farmers of Rajasthan (Perumal *et al.*, 2013) [1].

Scientists from Central Arid Zone Research Institute, Jodhpur have validated that chick pea flour mixed with butter milk (rabri) helps to expel the retained bovine fetal membrane (Perumal *et al.*, 2013) [1]. In this regard the parched chickpea flour (1 kg) mixed with butter milk was fed to the affected animals (4 cows and 3 buffaloes). The retained placenta was expelled out within 24 hours in majority of animals (Perumal *et al.*, 2013) [1]. Parched chick pea flour in butter milk used in Nagaur (Rajasthan) for effective expulsion of retained placenta in 1-24 hours (Das, 2003) [83].

Root of *Cichorium intybus* plant mixed with roots of *D. strictus*, tender culms of *Phragmites maxima*, fruits of *Foeniculum vulgare*, and solidified sugarcane juice are crushed and boiled and the liquid is strained and given to hasten the expulsion of afterbirth in buffaloes and cows (Ali, 1999) [80].

Moringa stenopetala bark (0.5 kg) is crushed and mixed with

1 litre of warm water. Sieve and administered as a drench to animals has been suggested. One litre for a cow, 0.5 litre for a sheep or goat was mentioned. The administered was repeated every 2 hours until the placenta is discharged (Dharani *et al.*, 2015) [84].

Half kg of *Salvadora persica* roots was crushed and soaked in 1 litre of water for 12 hours. The liquid is used drench, given 1 litre to large animal and, 0.5 litre to smaller animals. Repeat daily until the placenta is expelled (Dharani *et al.*, 2015) [84].

A handful of fresh stems of *Cissus quadrangularis* and half a cup of wood ash in 0.5 litre of water were mixed and left for 10 to 15 minutes. The sieved liquid was suggested to be given as a drench to animals, 0.5 litre for large animals and 0.25 litre for small stock. The liquid was administered twice a day until the placenta was discharged. (Dharani *et al.*, 2015) [84].

One study suggested crushing 0.5 kg of roots or bark of *Balanites aegyptiaca* and placed in 1 litre of water. Subsequent to boiling for 10 minutes, the liquid was cooled, sieved and drenched with 1 litre for cows, donkey and camels, 0.5 litre for sheep and goats. Repeat once. (Dharani *et al.*, 2015) [84].

A number of other combinations such as roots of *Harrisonia abyssinica*, *Grewia villosa* and *Ricinus communis*, barks of *Acacia drepanolobium* and leaves of *Carica papaya* were mentioned to be useful in expulsion of retained placenta of cows (Dharani *et al.*, 2015) [84].

4.6 Different combination of plant extracts with other ingredients suggested for Brucellosis

Half kg of fresh roots of *Salvadora persica* were crushed and subsequent to boiling for one hours in 5 litre of water. Administered after cooled and sieved as a drench for animals

that have aborted. Use 2 litre for cows, 1 litre for goats and sheep. Drench once only. Fine powder of Two kg of dry *Kigelia Africana* fruit is mixed with powdered horse bone and 18 kg of salt and give as a supplement to affected animals every day for 1 month. (Dharani *et al.*, 2015) [84].

4.7 Different combination of plant extracts with other ingredients suggested for venereal disease

A number of combinations of extract of leaves of *Acalypha fruticosa*, *Aloe secundiflora*, bark of *Acacia oerfota*, *Acacia drepanolobium* and seeds of *Azadiracta indica* were mentioned to be useful for venereal disease (Dharani *et al.*, 2015) [84].

4.8 Different combination of plant extracts with other ingredients suggested for Uterine Infections

The immuno modulatory property of *Aristolochia indica* (Isharmur) can be proved an aid in preventing the uterine infection by augmenting local immune system (Ali Sager *et al.*, 2003) [79].

One study (Parmar, 1999) [85] suggested the oral administration of roots of *Convolvulus microphyllus* for therapy of uterine infections in cows.

4.9 Different combination of plant extracts with other ingredients suggested for Smooth Delivery

For easy parturition some of the herbs suggested for oral feeding include *Cheonopodium album* (boiled grain), *Girardinia diversifolia* (dried leaves), and *Hedychium spicatum* (seeds) can be fed to animals (Kumar *et al.*, 1999) [86] and leaves paste of *Argyria nervosa* with about rice beer (Pal, 1980) [87]. Another approach is the local application of crushed bark of *Bombax ceiba* to vaginal ostium (Bhattari, 1994) [88].

4.10 Different combination of plant extracts with other ingredients suggested for Cervico Vaginal Prolapse

The oral administration of crushed cactus mixed with butter milk (Vankar, 1994) [89], fruit juice of *Citrus medica* is mixed with powdered fruits of *Cuminum cyminum* (Ali, 1999) [80], paste of the whole plant of *Gomphrena serrata* (Ali, 1999) [80] or Leaf paste of *Trichodesma indica* and the decoction of root suckers of *Phoenix acaulis* (Ali, 1999) [80] have been suggested for therapy of prolapse of vagina, cervix and uterus in cows. Some other plant extracts have also been mentioned (Table 9).

Table 9: Plants Used for Cervico Vaginal Prolapse

S. No.	Plants	Extract	References
1	Singhara (water chestnut)	flour Singhara (water chestnut)	(Singh <i>et al.</i> , 2002) [90].
2	<i>Zyzzyphus rummularia</i>	Root extract	(Sebastian and Bhandari, 1984) [91].
3	<i>Phoenix acaulis</i>	root suckers	(Ali, 1999) [79]

4.11 Plants Used for improving Semen Production

Herbs have been used for curing ailments for many centuries. Sexual issues are no different. Civilizations from every continent have discovered numerous plants and herbs that

help to produce more semen (Table no.10). These herbs and plants help to attain stronger ejaculations, higher sperm counts, greater semen volume, and better overall sexual health (Perumal *et al.*, 2013) [1].

Table 10: Different plants used for the improvement of sperm volume, Erectile Dysfunction and Impotence.

S. No.	Plants	Action	References
1	Horny goat weed	Increase sperm volume and testosterone levels and to treat impotence.	Rost, (2009) [90]
2	Gokshura, also called Ji li or tribulus terrestris	Chinese herb that stimulates sperm production due to its steroidal saponin content	Martino-Andrade <i>et al.</i> , (2010) [91], Rost, (2009) [90]
3	<i>Tinospora cordifolia</i>	Semen volume, sperm motility,	Jayaganthan <i>et al.</i> , (2012) [92]
4	mixture of <i>Eurycoma longifolia</i> , <i>Tribulus terrestris</i> and <i>Leuzea carthamoides</i>	Boars enhanced the, daily sperm production, sperm survival and sex libido.	Frydrychova <i>et al.</i> , (2010) [93]
5	<i>Tribulus terrestris</i>	Semen volume, sperm motility,	Perumal <i>et al.</i> , (2013) [1].
6	Horny Goat Weed (<i>Epimedium sagittatum</i>)	Increases sperm cell production, and is a common aphrodisiac.	
7	Saw palmetto	Very good for the prostate	
8	Shatarvi (Tian Men Dong)	ED and impotence	Perumal <i>et al.</i> , (2013) [1].
9	Sarsaparilla herb	Increase in testosterone and progesterone levels	
10	Muir Puama or Murapuama	From Brazil, helpful with ED and impotence, and helps give firmer erections	
11	Cordyceps (<i>Dong Chong Xia Cao</i>)	Libido booster. Also lowers blood pressure and improves sleep.	
12	Ginko Biloba	“Brain-boosting” power	
13	Cardamom	aphrodisiac	

5. Herbal Preparations

Many indigenous preparations (Table 11) are marketed by Indian Pharmaceuticals and have been suggested to manage

delayed puberty, post partum anoestrus and for non seasonal breeding in domestic animals.

Table 11: Commercially available herbal medicines, their ingredients and use.

S. No.	Medicine trade name	Herbs included	References
1	Exapar	<i>Aloe barbadensis</i>	Gupta, 1982 ^[94]
		<i>Aristolochia indica</i>	Chopra <i>et al.</i> , (1982) ^[95]
		<i>Gloriosa superba</i>	Tewari <i>et al.</i> , 1967) ^[96]
		<i>Peganum harmala</i>	Kapoor, 1990 ^[97]
		<i>Plumbago zeylanica</i>	
		<i>Rubia cordifolia</i>	Nadkarni, 1954 ^[22]
2	new coded formulation AV/UTL/17	<i>Lepidium sativum</i> , <i>Citrullus colocynthis</i> , <i>Plumago zeylanica</i>	Singal, (1996) ^[98] ; Walia <i>et al.</i> , (2010) ^[99] , Khanna <i>et al.</i> (1997) ^[100]
3	An electuary prepared from liquid extract of ergot (8 ml), quinine sulphate (5 g), magnesium sulphate (200 g), pulv. Gentians (16 g) and molasses are known cleansing after parturition.		Perumal <i>et al.</i> , (2013) ^[1] .
4	Aloes compound (Alar-sar),	<i>Aloe barbadensis</i> (Kumari), Hirabol (<i>Commiphora mtrrha</i>), Jeevanthi (<i>Holostemma adakodien</i>), Kambhoji (<i>Kirganelia reticulata</i>), Kasisa bhasma, Manjishta (<i>Rubia cordifolia</i>), Hurmal (<i>Peganum harmala</i>)	
5	Sajani (Sarabhai),	Mrigakshi	
6	replanta, (Indian Herbs)	Krishna, Ushan, Espand, Raktangi, Carvi, Payasvini, Hattavilasini, Yausahya, Gundra, Vanspatri, Shakrapushpi, Tundkeshi, Paribhadra, Naktamal, Nandini, Palanksha, Vrish, Kinihi	
7	Utrifit (Indian Herbs),	<i>Gloriosa superb</i> , <i>Plumbago zeylanica</i> , <i>Peganum harmala</i> , <i>Caesalpaenia bonducella</i> , <i>Piper longum</i> , <i>Lepidium sativum</i>	
8	Uterotone (Cattle Remedies)	<i>Desmodium gangeticum</i> , <i>Uraria picta</i> , <i>Bambusa arundinacea</i> , <i>Solanum indicum</i> , <i>Tribulus terrestris</i> , <i>Stereospermum suaveolens</i> , <i>Premna mucronata</i> , <i>Gmelina arborea</i> , <i>Aloe vera</i> , <i>Ferrous sulphate</i> , <i>Copper sulphate</i> , <i>Sodii biboras</i>	
9	Septilin, a herbal product of Himalaya Herbal Heatheare,	<i>Tinospora gulancha</i> , Licorice, Indian bdellium	

The preparations marketed for anestrus include Prajana H.S (Indian Herbs; Natural Remedies), Janova (Dabur Ayurved), Aloes compound (Alarsar), Fervivet (Ar Ex Labs), Sajani(Sarabhai), Heat-Up(Century), Heatraj (Rajan) etc. These formulations are potent combination of herbs formulated to induce ovarian activity. The proposed mechanism of action is proposed to be similar to gonadotrophins. Though, a very high success rates for inducing ovulatory estrus and subsequent conception were reported, their clinical applicability and efficacy under field conditions, on a large cattle population, has not been proved. However, supplementing essential amino acids, minerals and trace elements with or without these preparations seems logical and encouraging results are expected.

6. Conclusion

The aim of writing this review is to update the traditional knowledge and belief of the people in the ancient veterinary medicine practices which was adopted across the world. Still, many practices of ethno veterinary seeks legitimate and validate among the practitioners. EVM is now increasingly integrated into "participatory epidemiology" which seeks to improve epidemiological surveillance in remote areas and encourage community participation in disease control (Mathias, 2004) ^[101].

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