

Ethno Veterinary Science and Practices for Reducing Antimicrobials and other Veterinary Drugs in Livestock Health Care

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1. Introduction

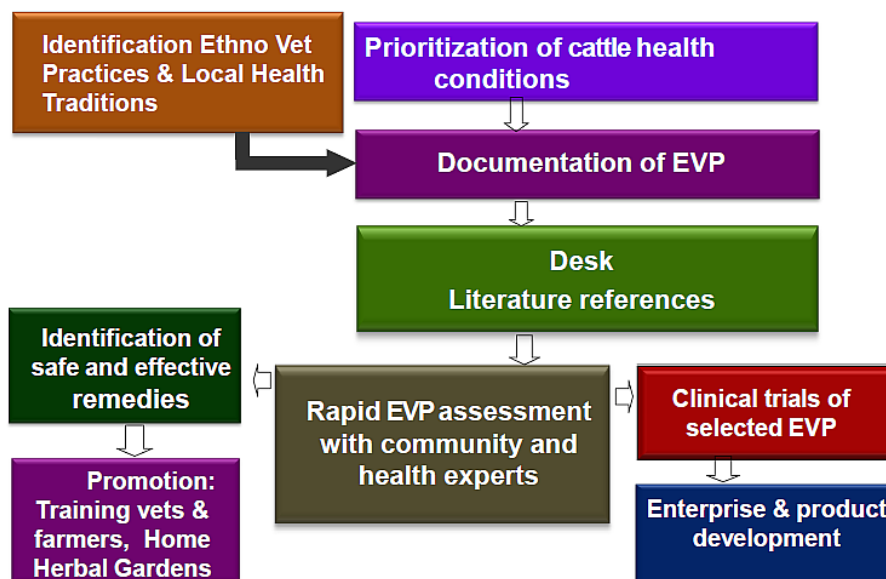
In India there is a rich tradition in the use of natural products for human and animal health. Ethnoveterinary medicine is defined as the combination of knowledge, skills, and practices based on the experiences, theories and beliefs in indigenous cultures that are used for healing animals (Ozioma and Chinwe, 2019). Ethnoveterinary medicine in India has an estimated 3000 years documented tradition. In rural India animals are considered as an integrated part of the family and play an important role in economic, social and religious systems. A programme to revitalise the ethnoveterinary traditions was started in 2001 in Bangalore. For this they used community based rapid assessment with folk healers, Ayurvedic doctors, veterinarians, botanists and field workers. The basic principle was a consensus between the different medical systems about the efficacy and safety of the remedies to manage health conditions. Nearly 70 % of the practices were substantiated by evidence from Ayurvedic and modern pharmacology. In total 116 plant species were used for 19 common health conditions in cattle (Santhanakrishnan et al., 2008). Most plants were readily locally available, or used as kitchen herbs, or can be grown in homestead gardens.

2. Documentation and rapid assessment of local health traditions.

Figure 1. Identification of ethnoveterinary practices, the community is involved.



Figure 2. Steps in EVP implementation strategy



As an example the remedy for mastitis consisting of *aloe vera*, *curcuma longa* and Ca hydroxide will be discussed. The Ayurvedic assessment revealed that it has activities as wound cleanser, wound healer, anti-inflammatory, anti-infective, anti-microbial. It is freshly made and applied on the udder after milking and cleaning 6-10 times per day. When a mastitis is chronic *Cissus quadrangularis* can be added. There has been a publication about this treatment (Punniamurthy¹ et al., 2017). In an in vitro study they showed antimicrobial action against for determination of antimicrobial activity of the remedy against *E. Coli*, *S. Aureus* and *P. Aeruginosa*.



EVP remedy for Mastitis





Aloe vera




Curcuma longa







Calcium hydroxide






Effect of mastitis treatment



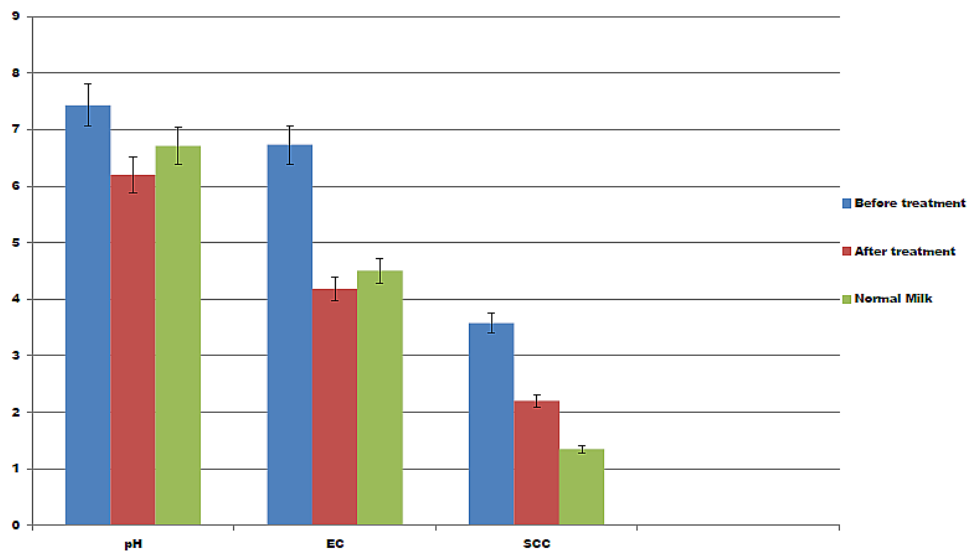




Note: In case of chronic mastitis: add *Cissus quadrangularis* and continue treatment until hardness of the udder has completely disappeared



They also looked at the pH, electrical conductivity and somatic cell count as parameters for mastitis. Apart from SCC pH and conductivity returned to normal levels after treatment. SCC was reduced but it took some time to return to normal values.

Figure 3. Reduction of acidity (pH), electrical conductivity (EC) and somatic cell count (SCC) before (blue) and after (red) treatment with herbal formula as compared to normal values (green)



3. Reverse pharmacology

Reverse pharmacology is the science of integrating documented clinical/experiential hits, into leads by transdisciplinary exploratory studies and further developing these into drug candidates by experimental and clinical research. In this case the herbs *aloe vera* and *curcuma longa* used in the mastitis formula were investigated for their docking activity for *S. Aureus* proteins (Punniamurthy² et al., 2017). Molecular docking is used in the field of molecular modelling to predict the preferred orientation of one molecule with another molecule when in a stable binding complex with each other. Using scoring functions the binding affinity is predicted. Docking is a valuable tool to study the binding affinity of drug molecule to the target proteins. They showed that bioactive components of turmeric and *Aloe vera* are effective against the target proteins of *S. Aureus*. They concluded that the infection caused by *S. aureus* can be treated by targeting its essential proteins using tropical application of turmeric, *Aloe Vera* and lime.

4. Outcome of EVP training and intervention studies

Milk of the 140 farmers was also tested for presence of: Streptomycin, Neomycin, Chloramphenicol, Gentamycin, Quinolones, Tetracycline & Sulfa. It appeared that residues were absent in all samples!

Table 1 shows the effectiveness against common diseases.

No	Clinical condition	Number of Animal treated	% cure
1	Mastitis	38305	93.27
2	Indigestion	9212	90.68
3	Foot & Mouth (FMD)	11669	93
4	Foot lesion	4388	92
5	Fever	51691	92.5
6	Diarrhea	50015	96.72
7	Joint swelling	500	90
8	Bloat	1830	86.75
9	Udder edema	1982	95.49
10	Repeat breeding	4637	84.37
11	Deworming	5906	95.77
12	Wound	1335	83
13	Uterus prolapse	429	76
14	Retention of Placenta (ROP)	1128	74
15	Downer	999	76
16	Udder pox, warts	658	67.6
17	Teat obstruction	1134	75.5
18	Ectoparasites /Ticks	1401	93.57
19	Haemogalactia	1336	95.5

Also the treatments were very effective in reducing financial loss and loss of milk production.

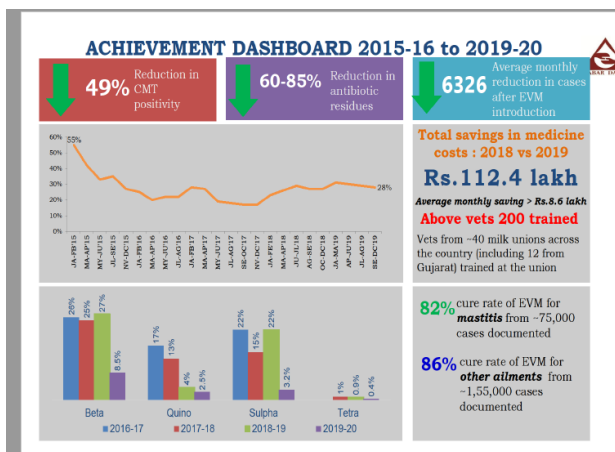
Table 2: Effects on milk production.

Quantity of milk before - after treatment with herbal formulations		natural livestock farming india			
Disease condition	n	Before treatment	After treatment	Loss of milk in liters	Financial loss (Rs)
1 Mastitis	35	14.4	14.0	0.4	10
2 Maggot wound	28	13.7	13.3	0.4	10
3 Bloat & Indigestion	34	14.0	14.0	0.0	nil
4 Repeat breeding	23	15.0	14.8	0.2	5.0
5 Cow pox	18	15.6	15.1	0.5	13
6 FMD	22	10.3	11.0	- 0.7	+18
(Rs 26 per liter)					

Table 3 shows the effect on repeat breeding.

Krishna Milk Union				
Repeat Breeding cases treated by EVM				
Total no. of cases recorded	Total no. of Cases treated with EVM	Animals calved after EVM	Animals conceived, at various stages of pregnancy	% animal conceived
532	532	385	135	97.74 %
Cost effectiveness in comparison to antibiotics :-				
Over all treatment cost of Repeat breeding cases by EVM is about Rs.50/- to Rs.75/-				
While the treatment cost by antibiotics is about Rs.1000/- to Rs.1500/- with no guarantee on conception.				

Total achievements shown in table 4



Concerning the question of identification of plants, only a limited number of very common plants are used for these herbal remedies. Rest of them are spices from the kitchen. All the plants used are identified and certified by taxonomist. When people are trained there is a session on the identification of each plants and we also check the plants before the establishment of herbal garden and ensure correct identification.

Conclusions

In India EVM appears very effective to treat dairy cows for most common diseases and reduces the costs for the farmers, and amount of antibiotic residues in milk.

Acknowledgement

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