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Ethnoveterinary practices (EVP) for control of ectoparasite in livestock

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The inclusion of traditional plant-based ectoparasite control methods in primary healthcare of livestock is increasingly becoming an important intervention for improving livestock productivity in resource challenged tribal areas. The study was conducted at Peint and Jawhar blocks of Nashik and Palghar districts of Maharashtra. The effectiveness of Ethno veterinary practices (EVP) for control of ectoparasite was assessed through social acceptance and field study. The formulations were prioritized considering its effectiveness, accessibility, easy to treat and fast post recovery. The formulations were co-related with modern literatures to gauge its scientific reference.

The prevalence of tick infestation on different body part examined of cows, buffaloes was suggested that udder had maximum presence of ticks on buffaloes and cows. The EVP has significant effect in reduction of tick population in Buffaloes, Bulls and Cows was recorded. The study reveals that, the efficacy of herbal medicine to reduce the tick's incidence on buffalo is 63%, bull 60% and cow 61% were recorded.

Keywords: Ectoparasites, Ethnoveterinary medicine, Social validation

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Ethno Veterinary Medicine (EVM) is a scientific term for traditional animal health care that encompasses the knowledge, skills, methods, practices, and beliefs about animal health care found among community members. It has been observed that the traditional knowledge of EVM is now confined only among the surviving older people and a few practitioners in the tribal communities (Usha *et al.*, 2016). Lack of documentation of ethnovet practices makes it difficult to know how long a particular remedy has been in use and whether the preparation or administration method has ever been altered or not.

Livestock industry provides for a major source of livelihood for many people worldwide, particularly the rural poor especially tribal in developing countries. Illness is a major constraint to livestock production and development in rural and peri-urban communities where a half of the world's livestock population is found. Most of these communities live in marginal areas affected with endemic pathogens, vectors and diseases (Wanzala *et al.*, 2005).

The resource poor families in the Jawhar and Peint Tahsils have a practice of open grazing in the forest and agriculture field after harvesting of crop.

They keep animals mainly for agricultural operations and less preference to milking. However, the animal husbandry especially cow and buffaloes keeping are the main occupation and livelihood for the tribal communities in study areas. Due to unhygienic in herd and open grazing the chances of ectoparasite in livestock will be more common and causing heavy blood losses, irritation, hide damage and weight losses resulting in lower productivity, as well as mortality too. Ticks have a major impact on livestock industry as they are responsible for substantial economic losses (Kaur *et al.*, 2016).

A vaccine against ticks which enhances the natural immunity often acquired by animals in response to tick infestation was developed. However, it has not proven to be successful in the developing countries. EVP, performed by rural people in many indigenous communities for the ancient times, are successful in combating many ailments in human and livestock including tick infestation (Kaur *et al.*, 2016).

Study area

The field study was carried out in Jawhar and Peint blocks of Palghar and Nashik district of Maharashtra. They are situated in northern central coastal plain zone of the Maharashtra at 73.23 E long and 19.90 N

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latitude and 73°30'11.3"E long and 20°15 '29.9"N latitude. The land in the study area is mainly used for agriculture and livestock. A mean annual rainfall and temperature of Jawhar and Peint is 3287 mm and 1823 mm per year and 24.8°C and 24.2°C respectively. The livestock population in Nashik district, cows 3.62 lakhs and buffaloes 1.29 lakhs and for Palghar district cows 1.11 lakhs and buffaloes 1.26 lakhs. (Animal Husbandry statistical booklet 2016-17)

Methodology

During the years 2015-17, the extensive field study was carried out in both the clusters. The information about plant resources, occurrence of animal diseases and their control measures and local treatments were collected through PRA and focus group discussions (FGD). The list of animal disease occurrence and its frequency were recorded. Through FGDs top 5 frequently occurring ailments were prioritized, in which ecto & endoparasites, diarrhoea, wound and Bloat, in which ectoparasite were found to be more frequently and major concern of protection from ticks in the areas like remote tribal villages.

The herbal medicines used for treatment of ectoparasite was documented through direct interview with the local healers, in which the information related to address, age, gender, Plant, method of Preparation, dose and method of administration were recorded. Further, verified and cross checked the plants name, medicine preparation, use, etc. through

one to one discussion. The following steps were given as below.

1. Listing of all formulations practiced by various healers

Based on the interview of healers and their earlier experience practicing in control of ticks population in livestock's we have documented the various formulation by various healers and listing of all formulations practiced by them.

2. Rationale behind plant use for preparation of herbal medicine for control of ectoparasite

The efficacy or quality of plants for particular ailment was well assessed practically by healers. For ectoparasite control, the effectiveness of the plant is pursuing like bitterness, pungent smell, itching, etc. The details are given as below.

3. Prioritizing the top formulations

Two groups were formed of progressive farmers who have benefited and healers. The FGD between these two groups was held and discussed more about herbal formulations which are more effective. The list of herbal formulations was prepared and in which top 3 formulations were prioritized considering its effectiveness/success on ticks control, availability of plants, easy to treat and less expensive (Table 1).

Table 1 — Top Prioritized Herbal Formulation Used to Control the Ticks

Formulations	Local Name	Botanical name	Method of preparation	Dose & method of administration
F-1	Gulvel	<i>T. cordifolia</i>	Take 150 g Gulvel stem, 500 g Chibad fruit, 100 g Kadunimb bark, 130 g Nirgudi leaves and 25 g Vekhand rhizome. Crush all the plants to get the fine paste and keep it in 10 L of water for overnight and filter the juice.	Spray the medicine once, using spray pump.
	Chibad	<i>C. sativus forma hardwickii</i>		
	Kadunimb	<i>A. indica</i>		
	Nirgudi	<i>V. negundo</i>		
	Vekhand	<i>Acorus calamus</i>		
F-2	Chibad	<i>C. sativus forma hardwickii</i>	Take 500 g of Chibad fresh fruits and 250 g of salt. Crush these two ingredients properly. Then add this to one litre water and mix properly.	Apply on the entire animal body, especially near ears, base of horns, dewlaps and udder etc. The application has to be done for onetime in a day and continue same after a week.
F-3	Chibad	<i>C. sativus forma hardwickii</i>	Take 100 g of Chibad fruit and 250 g of common salt mix together and then crush it properly till you get smooth paste by adding water and the liquid paste is rubbed on the skin. Apply on the body surface with 300 mL of long stored Mahua oil.	Massage with Mahua oil on the body after four hours of application of the medicine. Repeat the same after a week. (After oil application animal should be kept in shade for a day)
	Mahua	<i>Madhucaindica</i>		

4. Review of literature

A group discussion was made with experts of different disciplines such as veterinarians, ayurvedic, pharmacologist, parasitologist, ethnobotanist, forestry, animal nutritionist and Extension workers to collect the opinion about plants and properties. The information from various journals and books related to each of the plants species was collected, emphasising to its contemporary relevance to modern medicine and its therapeutic use. Further, based on the available information and opinion of the expert panel, the final herbal formulation was finalized for further field study (Table 1).

5. Use of top one formulation at field level

In the herds only highly tick infected animals were selected. The ticks in different parts of animal body were counted (udder, year, tail, hoof, near horn) and counted the ticks before use of herbal medicine. Plant (Table 2) were crushed gently and kept it for an overnight. Next day morning, the medicine was sieved and kept for 10 min to allow it to settling the particles at bottom of the container. Then slowly the juice was poured to another container. The medicine was spread on the body surface using hand pump. After 5th day of spray, again the ticks were counted in the same place. Meanwhile the precautionary

measures to control the reoccurrence of ticks were taken care by spraying salt water and broadcasting lime powder in cattle sheds.

Results and discussion

The prevalence of ticks infestation on different body part of examined on cow, buffaloes was suggested that udder had maximum presence of ticks on buffaloes and cows (Table 3). This intensity of infestation may be due to various factors like unhygiene, poor management practices and type of breed. The study of Musa *et al.*, 2014 also suggest that, the prevalence of tick's infestation on udder and genitalia had maximum (83.4%).

The study was conducted on 180 animals and equally grouped the animal that is buffaloes (60), bulls (60) and cows (60) which are heavily infested. In each of the 60 animals, further each animal was grouped for each of the selected top prioritized formulations. The efficacy of different herbal formulations was evaluated using a formula described by Morin *et al.* (1996)

$$\text{Efficacy (\%)} = \left(\frac{T_B - T_A}{T_B} \right) \times 100$$

where,

T_B = (Mean tick no. before treatment)

T_A = (Mean tick no. after treatment)

Table 2 — Plants Considered by the Healers Based on the Following Characteristics

Sr. no	Local Name	Botanical name	Rationale behind plant usage by healers	Review of literatures
1	Chibad	<i>C. sativus</i>	Bitterness is very high, Ticks start falling on the ground after application, available at locally, Dry powder can un be used, Easy to prepare a medicine.	(Yoganarasimhan, 1996), (Ghotge and Ramdas, 2008)
2	Neem	<i>Azadirchta indica</i>	Bitter test, easy to extract the juice, Bitter smell, Insect repel easily, More accessible, No side effect, helps to healing infection, Repels the House fly	(Bhattacharjee, 2000)
3	Gulvel	<i>T. cordifolia</i>	Bitter test, Sticky helps to retain the medicine for longer time on the surface of the body, Easily available.	(Warrier and Nambiar, 1993)
4	Nirgudi	<i>V. negundo</i>	Pungent smell works as a repellent, Good for control of insect	(Nadkarni, 1982)
5	Vekhand	<i>Acorus calamus</i>	Pungent, Repellent, available in the house	(Warrier and Nambiar, 1993)

Table 3 — Part Wise Infestation of Ticks on the Animal Body

Part wise Average Ticks infestation (each animals, n=60)

Species	Horn	Ear	Eye	Foot/ Dewlap	Leg	Udder/inguinal region	Tail	Back
Buffaloes	1	1	1	2	2	8	3	4
Bulls	0	1	0	2	1	5	0	0
Cows	0	0	0	1	1	4	2	2

Table 4 — Efficacy Herbal Formulations for Control of Ticks in Livestock

Species	Formulations	No. of animals	Average number of Ticks population		Efficacy %
			Before treatment	After treatment	
Buffalo	F-1	15	16	6	63
	F-2	15	15	7	52
	F-3	15	63	36	43
	Control	15	60	62	-4
Bull	F-1	15	36	15	60
	F-2	15	14	6	55
	F-3	15	14	7	50
Cow	Control	15	10	11	-5
	F-1	15	19	8	61
	F-2	15	45	22	51
	F-3	15	11	6	45
	Control	15	6	6	-2

The study reveals that, the reduction of ticks number is high in herbal formulation F1, i.e., 63% in buffaloes, 60 in bull % and 61% in cow followed by formulation F2 and F3 (Table 4). The infestation increased in control group by 2% in cow, 5% in bull and 4% in buffalo. The F1 herbal formulation is made up of plants such as *Gulvel (Tinospora cordifolia)*, *Chibad (Cucumis sativus forma hardwickii)*, *Kadunimb (A. indica)*, *Nirgudi (V. negundo)*, *Vekhand (Acorus calamus)*. The present study supports with the Ponnusamy *et al.*, (2016), *Azadirachta indica* is used as an ectoparasite control in many parts of India, as it has action against insects such as antifeedancy, growth regulation, fecundity suppression and sterilization, ovipositorrepellence. The extract prepared from the leaf, seed and bark of the *A. indica*, the seed extract showed very high level of efficacy (80%) after 5 h of treatment (Srivastava *et al.*, 2008). *Vitex negundo* leaves are used to control ectoparasite by burning them and producing smoke. *Acorus calamus* is ground and applied over the affected areas of the skin (Dhanam and Elayaraj, 2014).

Conclusion

As the infestations of ectoparasite are major economic loss to dairy farmers, the use of local herbal medicine will be a best option to the tribal farming community living in remote areas. The plants used in study such as *T. cordifolia* (Gulvel), *C. sativus forma hardwickii* (Chibad), *A. indica* (Neem), *V. negundo* (Nirgudi), *Acorus calamus* (Vekhand are commonly available to farmers in villages. The study shows that, by using common herbal medicine can be effective

(buffalo 63%, bull 60% and cow 61%) for control of ticks.

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