Eco-friendly control of tick infestation among dairy animals using NIF's polyherbal medication

Increasing productivity assumes greater importance in the midst of environmental challenges as well as production constraints in livestock sector. Health management in dairy farming which limit the actual potential of yield to 40-75 per cent in different regions of the country. Ectoparasite infestation causes reduction in milk yield to the tune of 14-23 per cent, quality of hides (20-30%) and live weight (~1g/day). Ticks are harmful as blood sucking parasite severely affecting productivity of dairy animals and a major economic impediment, welfare concern in dairy farming.

Tick bites reduce feed intake of animals due to irritation caused by feeding activities influencing the host's metabolism. Each tick sucks not less than 30 drops of blood to complete its life cycle. Loss of blood results in retarded growth and lowered body weight. The weakness of the host sets in about 5 days after attachment of the tick.

Tick control is practised in a variety of ways. Treatment of hosts with acaricides to kill attached larvae, nymphs and adults is most widely practised though with constraints, as reoccurrence of these parasites is common. The introduction of new chemical compounds becomes necessary due to quick development of resistance in tick population. This is a challenge for sustaining farming system as the problem have to be controlled in cost effective and sustainable manner.

The indigenous knowledge system offers a range of herbs with such acaricidal properties. Plant materials are known to possess insecticidal, growth inhibiting, anti-molting and repellent activities. The development of field oriented, cost-effective and easily available quality herbal acarcide to control ticks without any significant adverse effects on the environment is the need of the hour.

NIF mediated poly herbal medication :

National Innovation Foundation (NIF)- India, an organisation under DST, based in Gujarat brought out a poly herbal medication involving neem and monk pepper leaves

based on the ingenuity of community knowledge to control ticks. This formulations based on herbs was scientifically evaluated, demonstrated in different locations of the country.

Collaboration with ICAR-National Dairy Research Institute for field testing

National Innovation Foundation had collaborated with NDRI in the form of a research program towards for field testing of poly herbal medication. NDRI had evaluated with 47 farmers involving 203 animals in three districts of Haryana namely Karnal, Jind and Bhiwani during 2019-2020. The study was conducted in Kutail, Amritpur Kalan and Kunjpura villages in Karnal district; Brat Khera, Buana and Ramrai villages in Jind district and Pur and Kungar villages in Bhiwani district.

Method of preparation and application

- The common herbal ingredients Indian lilac (*Azadirachta indica*) locally called neem and monks pepper (*Vitex negundo*) locally called Nagod/Mala to be collected in study regions.
- About 2.5 kg of freshly collected leaves of Neem tree to be kept in 4 litres of lukewarm water and similarly about 1 kg of leaves of Nagod/Mala plant to be kept in 2 litres of lukewarm water .
- Preparation is kept overnight or approximately 12 hours duration under normal room temperature.
- Subsequently, the crude extract to be filtered and collected separately. About 300 ml of crude extract of neem and 100 ml crude extract of monks pepper were mixed in the ration of 3:1 and kept as stock solution.
- This 400 ml preparation was mixed in 3600 ml of fresh water/tap water for application at small holder farm units at the times of requirements.

Administration of medicine

The indigenous polyherbal medicine was prepared and administered only for first three days in all the eight villages. The medicine was administrated two times daily viz., both in morning and evening. The treatment solution (*Azadirachta indica*+ *Vitex negundo*) is provided for three days to animals affected with ticks. After providing treatment,

observations were recorded after 7th day, 14th day, 21st day and 28th day by counting ticks in udder, dewlap, ear and other body parts with cooperation of farmers, veterinary officers and scientists of LUVAS in the respective study area.

Impact of poly herbal medication:

- NIF's Polyherbal medication has significantly reduced the tick population.
- The animals upon treatment with the NIF open source technology was found to reduce to 34.57±3.35 [Mean± S.E] by 48 hours. However by end of 56 hours the reduction was 24.63±2.34 [Mean± S.E]. The observation upto 28th day reflected that there was not much recurrent infestation as the infestation rate was found to be 3.84±0.29.
- The percent efficacy of this preparation over infested animals was found to be 92.97 percent by 28th day of observation.
- The study had found that this medicine at farmers field had shown efficacy over hard tick infestation of *Hyalomma Anatolicum Anatolicum.*
- The reoccurrence of tick infestation over treated animals were not noticed during the experimental period.
- Post treatment inhibitory efficacy upto 45 days over the natural infestation was found in all the study locations.
- By using the NIF mediated polyherbal medication, the farmers can repeat the treatment once in 40-45 days.
- Farmers incurred the expenditure of Rs.1440/- towards purchase of acaricides and veterinarian charge per animal per year with average recurrence of 25-30 days.
- The treatment cost is approx Rs.20 to Rs.30/ animal/ 45 days which works out to be Rs.160 to Rs.240 in one year. Farmers were convinced of cost effectiveness of solution.

- Farmers themselves can prepare the solution as neem and nirgundi are freely available.

Scaling up

Neem is available in all villages of Haryana. However, it was noticed that in the study region, Nirgundi (*Vitex Negundo*) was not widely prevalent although elders recall its usage about 40-50 years ago. Therefore, as part of upscaling the technology, the project team purchased 2000 nirgundi seedlings from Herbal Park, Forest Department, Haryana Government, Yamunanagar and distributed to 600 farmers in 30 villages including the villages adopted by NDRI and CSSRI under Farmers FIRST projects of ICAR.

Considerable number of plants is planted in NDRI campus and various veterinary offices, polyclinics, KVKs and Hameti, Jind regions. These plants are expected to reinforce indigenous knowledge system and assist in better utilization of locally available technologies for livestock welfare. A live herbal veterinary garden depicting the uses of different plants is being established in front of Dairy Extension Division, NDRI for the benefit of visitors, farmers and students.

Conclusion:

The characteristic of innovation such as relative advantage, less complexity, trial ability, compatibility propelled the interest on NIF poly-herbal medication among adopted and neighbouring farmers as well as veterinarians in AH department and LUVAS over the allopathic treatment.

Successful demonstration of indigenous herbal medications will ensure cost effective health care. Stakeholders of veterinary service like Veterinary Officers, Para Veterinary Staff were sensitized with usefulness of technology. Farmers could appreciate usefulness of this polyherbal medication that can be prepared at their farm field, reduce dependency of tick worry on their animals. Extension professionals can utilize this technical knowhow in their demonstration units or in animal health camps in pursuing green technologies.

Acknowledgement:

'Scientific and Financial support extended by National Innovation Foundation (NIF), Gandhinagar Gujarat is acknowledged'
(Source: The Project team, ICAR-National Dairy Research Institute, Karnal).