

1-15 DECEMBER, 2022

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Ethnoveterinary medicines have a cure rate of more than 80 per cent, shows an analysis by Centre for Science and Environment

EASY TO SWITCH

Low-cost ethnoveterinary medicines can help curb the use of antibiotics in Indian dairy sector and combat the overlooked pandemic of antimicrobial resistance

**DEEPAK BHATI,
RAJESHWARI SINHA
AND AMIT KHURANA**

NEW DELHI

SOME LIFESAVING solutions are so simple and obvious that they remain hidden in plain sight. This is particularly true for livestock disease treatments that have evolved over generations through experiences of communities, withstood the test of time, are embodied in local culture and practices and yet, the knowledge remains untapped in the absence of standardisation and scientific validation. More often than not, dairy farmers, and some field veterinarians, indiscriminately use antibiotics for treating even common infections in animals.

Researchers with Delhi-based Centre for Science and Environment (CSE) found evidence of such rampant misuse and overuse of antibiotics in 2020 and 2021, during consultations with dairy farmers and experts from various sectors such as animal husbandry, food safety, human health. They had observed that most dairy farmers skip the critical withdrawal period—a prescribed number of days during which the treated animal should be excluded from the milk supply chain to allow antibiotic residues to be excreted out of its body. In 2018, the Food Safety and Standards Authority of India (FSSAI) had also found antibiotic residues in milk samples.

Such abuse of antibiotics not only adds to the treatment costs, but also increases the burden of antimicrobial resistance (AMR). Interaction between antibiotic residues and pathogens in various environmental matrices (soil and water) and in living organisms can lead to formation and spread of bacteria that are resistant to antibiotics. A

comprehensive global study published in peer-reviewed journal *The Lancet* in January 2022, estimates that infections caused by these antibiotic-resistant bacteria played a part in the deaths of 4.95 million people in 2019 alone.

“Antibiotic residues in milk also interfere with the manufacture of several dairy products such as buttermilk, *shrikhand* (a dessert made with yoghurt) and curd by delaying starter culture activity, crucial for production of fermented milk products,” says Anilkumar Bayati, managing director of Sabarkantha District Co-operative Milk Producers' Union Ltd, also known as Sabar Dairy, in Gujarat.

One common infection among dairy animals that prompts farmers to depend on antibiotics is mastitis, which is caused by over 100 types of microorganisms such as bacteria, fungus and virus. The infection, triggered by rough milking, injury to the udder tissue or due to unhygienic farm conditions, causes inflammation of mammary glands and blockage of milk ducts. It thus affects milk production and manifests in change of milk colour, consistency or even presence blood in milk. A review of studies in 2021 by the National Institute of Veterinary Epidemiology and Disease Informatics, the only institute that conducts surveillance and monitors animal diseases, states that 18 per cent dairy animals in the country suffer from clinical mastitis, while 45 per cent display subclinical mastitis, with no specific symptom except a slight decrease in milk yield.

Now call it an effect of a lack of enough field veterinarians and extension services in the country, or easy over-the-counter access to antibiotics or the fear of losing milk, and therefore income, most dairy

REVIVING LOST WISDOM

National Dairy Development Board (NDDB) launched Mastitis Control Popularisation Programme (MCPP)

NDDB along with University of Trans-Disciplinary Health Sciences and Technology prepares brochure for farmers for important bovine ailments in 12 vernacular languages

Mastitis cases at Sabar Dairy treated with EVM shows 85% cure rate; eGopala mobile app launched

So far, 576 demonstration plots established by milk unions under NDDB guidance; trained 260 core group of veterinarians from 34 milk unions and producer companies; licensed EVM products launched

2013

Mastitis identified as one of the major animal health issues based on ear-tagging data

2014

2016

Ethnoveterinary medicines (EVM) integrated into MCPP

2017

2019

Sabar Dairy starts manufacturing and packaging of EVM products; Facebook page on traditional herbal formulations for cattle and buffaloes created

2020

2021

eGopala web version launched; Kaira milk union (Amul Dairy) started manufacturing and packaging of EVM products

2022

Source: Centre for Science and Environment

farmers rush to administer high doses of antibiotics to the cattle even at the slightest sign of mastitis.

To manage such common ailments and rationalise drug usage, especially antibiotics, the National Dairy Development Board (NDDB) in 2014 launched a project, Mastitis Control Popularisation Programme (MCPP). The programme, piloted at Sabar Dairy, initially focused on early detection of mastitis so that the animal can be treated using simple methods. Milk brought to the society by the farmer was checked using a test-kit called the California Mastitis Test (CMT). If the milk test-

ed positive for mastitis, the farm was identified, the animal found and given an oral regimen trisodium citrate (sodium salt of citric acid that has antimicrobial properties and can maintain normal pH of milk). After 10 days, the animal was tested again. A trial on 218 animals showed that two consecutive trisodium citrate treatments led to 89 per cent recovery.

Around the same time, NDDB was exploring other low-cost alternatives to allopathic drugs. In 2016, it joined hands with the University of Trans-Disciplinary Health Sciences and Technology (TDU), in Bengaluru,

which was researching on traditional herbal medicines for animals, also known as ethnoveterinary medicines. At Sabar Dairy, they conducted another trial on 30 cows affected with clinical mastitis. A reddish paste, prepared by mixing aloe vera, turmeric powder and lime, was applied on the

mastitis-infected area thrice daily for four to five days and the cattle were fed whole lemons. The medicine cured 29 cattle, with one farmer dropping out of the trial. “We found that ethnoveterinary practices can be both preventive and curative. It can be used by farmers themselves as a first response to any condition,”

says M Balakrishnan Nair, Emeritus Professor, School of Health Sciences, TDU. Following the successful trial, Sabar Dairy used its network of technicians, who conduct artificial insemination, to make farmers aware of its benefits. “We gave them an incentive of ₹22 lakh to implement the approach

WHAT MAKES IT SPECIAL

Simple ingredients of ethnoveterinary medicines that can work against several bovine ailments

Disease/Condition	Ingredients
Mastitis (all types)* (Water based preparation)	Aloe vera, turmeric, calcium hydroxide, lemon
Mastitis (all types)* (Oil based preparation)	Aloe vera, turmeric, calcium hydroxide, lemon, mustard or gingelly oil
Teat obstruction*	Neem leafstalk, turmeric, butter or ghee
Udder oedema*	Sesame or mustard oil, turmeric, garlic
Retention of placenta#	White radish, lady's finger, jaggery, salt
Repeat breeding#	Jaggery, salt, white radish, aloe vera, moringa, cissus stem, curry leaves, turmeric
Prolapse*	Aloe vera, turmeric, <i>Mimosa pudica</i> (shameplant)
Foot and mouth disease-mouth lesions*	Cumin seeds, fenugreek seeds, black pepper, turmeric, garlic, coconut, jaggery
Foot and mouth disease-foot lesions/wound*	<i>Acalypha indica</i> (indian copperleaf), garlic, neem, coconut or sesame oil, turmeric, mehndi, <i>tulsi</i> (holy basil)
Fever#	Garlic, coriander, cumin, <i>tulsi</i> (holy basil), dry cinnamon, black pepper, betel leaves, shallots, turmeric, chirata leaf powder, sweet basil, neem, jaggery
Diarrhoea#	Fenugreek seeds, onion, garlic, cumin seeds, turmeric, curry leaves, poppy seeds, pepper, jaggery, asafoetida
Bloat and Indigestion#	Onion, garlic, dry chilly, cumin seeds, turmeric, jaggery, pepper, betel leaves, ginger
Worms#	Onion, garlic, mustard seeds, neem, cumin, bitter gourd, turmeric, pepper, banana stem, common leucas, jaggery
Tick/Ectoparasites*	Garlic, neem leaves and fruit, acorus rhizome (sweet flag), turmeric, lantana leaves, <i>tulsi</i> (holy basil)
Pox/wart/cracks*	Garlic, turmeric, cumin, sweet basil, neem, butter or ghee
Allergy / poisoning / venomous sting/bite#	Betel leaves, black pepper, salt, jaggery
Hygroma (Swelling of joints) *	Aloe vera, lime, <i>Cissus quadrangularis</i> (veldt grape), turmeric, garlic, gingelly oil
Cough#	Adhathoda (adusa), <i>tulsi</i> (holy basil), garlic, turmeric, pepper, jaggery
Downer (not able to get up)#	<i>Desi</i> chicken eggs, moringa, <i>Cissus quadrangularis</i> (veldt grape), jaggery
Toxicity (Pesticide /HCN / Mycotoxin) #	Betel leaves, black pepper, salt, jaggery, tamarind, water, moringa extract
Blood in milk#	Curry leaves, moringa leaves, jaggery, lemon
Anoestrus#	Betel, pepper, moringa, tamarind, salt, jaggery

Note: *Topical application; # Oral administration;
Source: National Dairy Development Board and University of Trans-Disciplinary Health Sciences and Technology, Bengaluru

READY-MADE REMEDIES

Packaged ethnoveterinary formulations sold by milk unions and private players

LICENSED PRODUCTS

Malabar milk union, Kerala

Masticure*: Prevents all types of mastitis

Diar end: Prevents diarrhoea

Pyrexure: Reduces fever

Crack heal*: Treats warts, pox and cracks in teats

Heal all*: For wound healing

Rumatore: For indigestion, bloat, anorexia in cattle

Milk let: For galactagogue in cattle

Fly repel: For ectoparasiticide/ticks in cattle

Ayurved Ltd, herbal animal drugs company, Delhi

Diaroak: For diarrhoea of different etiology, calf scours, non-specific diarrhoea

Mastidip*: For prevention of udder infections, for teat and udder antiseptics, routine udder sanitisation

Charmil plus*: For foot and mouth disease lesions, deep-seated wounds, fungal infection, yoke gall, pyoderma, non-specific skin problems, scabies, maggot wounds, surgical wounds

Mastilep*: For treatment and control of clinical and sub-clinical mastitis, improving milk quality, promoting udder health

Trieto Biotech, a veterinary drugs company, Gujarat

Mastic lap*: Prevents mastitis

Mustfree: Prevents subclinical and clinical mastitis, increased milk yield, milk fat and SNF content.

Immuno syrup: Cures all types of pyrexia

Digiboost Syrup: Cures all types of nutritional diarrhoea

FEED SUPPLEMENT

Amul Dairy, Gujarat

Amul Masta Mix: Prevents subclinical and clinical mastitis, helps increase in milk yield and in let-down of milk

***Mastitis powder**: Prevents mastitis

Amul Immune: Improves immunity

Amul Rumen pro: Improves digestion in animals

Amul Utero Plus: Prevents metritis, helps in retention of placenta, abortion and agalactia

Sabar Dairy, Gujarat

Sabar Sanjivani: Prevents mastitis and sub clinical mastitis, helps to increase in milk production and fat, helps in agalactia

Sabar Mix*: Prevents mastitis

Sabar Saral: Improves digestion in case of diarrhea, indigestion, impaction

Sabar Sudarshan: Prevents fever and improve immunity

Sabar Amrut: Prevent mastitis

Sabar Uterine Cleanser: Prevents uterine infection, retention of placenta

Aloe sabar*: Prevents mastitis

Banas Dairy, Gujarat

Banas Shital: Prevents pyrexia

Banas Amrut: Prevents mastitis

Banas Pachak: Prevents indigestion, diarrhoea, enteritis

Note: The above products are just a few examples of the products available in the country; all products marked with an asterisk (*) are for topical application, while rest are for oral administration. Amrut is used for both oral and topical application

Source: Centre for Science and Environment

on the ground,” says Bayati. Since then, MCPP has expanded to 25 milk unions and producer companies across nine states—Kerala, Assam, Punjab, Andhra Pradesh, Karnataka, Maharashtra, Gujarat, Uttar Pradesh and Tamil Nadu. The expenditure of MCPP in 2021 was estimated to be ₹2,605 lakh, with NDBB paying ₹356 lakh and the rest borne by respective dairy cooperatives. Eight years

later, CSE researchers visited various milk unions and producer companies. Interaction with dairy farmers and veterinarians showed an encouraging impact of MCPP.

EXPANDING HORIZON

The success of ethnoveterinary medicines on mastitis prompted a greater demand from farmers and veterinarians on their use for other bovine ailments. NDBB thus expand-

ed the scope of MCPP to 29 other diseases, which includes common diseases like diarrhoea, deworming, fever, wounds, indigestion, and critical diseases such as foot and mouth disease. Effects of the medicines were recorded on NDBB's Animal Health Management Information System. CSE researchers have analysed the data collected till October 2022.

CONTINUED ON P22 >>

PROMISING NUMBERS

Cure rates achieved by farmers associated with milk unions and producer companies using ethnoveterinary medicines

MILK UNIONS, PRODUCER COMPANIES UNDER MCPP*	Mastitis (in %)	Fever (in %)	Diarrhoea (in %)	Indigestion (in %)
Andhra Pradesh				
Shreeja Mahila Milk Producer Company Ltd	73.6	100	84	66.4
Assam				
West Assam Milk Producers' Co-operative Union Ltd	96.1	-	-	-
Gujarat				
Maahi Milk Producer Company Ltd	80.8	-	85.7	100
Sabarkantha District Co-operative Milk Producers' Union Ltd	80	82.4	85.5	91
Karnataka				
Bengaluru Co-operative Milk Union Ltd	78.9	81.8	84.2	89
Dakshina Kannada Co-operative Milk Producers' Union Ltd	83	86.6	88.4	88.1
Kolar District Co-operative Milk Producers' Societies' Union Ltd	56.9	59.8	67.4	66.4
Mysore District Co-operative Milk Producers' Societies' Union Ltd	73.9	50.6	82.8	-
Kerala				
Malabar Regional Co-operative Milk Producers' Union Ltd	76	85.2	76.2	81.6
Maharashtra				
Kolhapur Zilla Sahakari Dudh Utpadak Sangh Ltd	71	74.2	78.7	84.8
Pune Zilla Sahakari Dudh Utpadak Sangh Ltd	96.6	-	97.9	100
Rajarambapu Patil Sah Dudh Sangh Ltd.	74.6	67.9	69.4	70.7
Punjab				
Baani Milk Producer Company Ltd	96.8	98.5	93.1	99.5
Ludhiana District Co-operative Milk Producers' Union Ltd	88	-	-	-
Ropar District Co-operative Milk Producer's Union Ltd	72.8	59.3	67.5	62.6
Uttar Pradesh				
Saahaj Milk Producer Company Ltd	83.5	91.3	81.5	80
MILK UNIONS, PRODUCER COMPANIES NO LONGER UNDER MCPP*				
Andhra Pradesh				
Krishna district Milk Producers' Mutually Aided Co-operative Union Ltd	69.1	89.4	92	96.6
Sri Vijaya Visakha Milk Producers Company Ltd	81.8	-	-	-
Gujarat				
Surat District Co-operative Milk Producers' Union Ltd	95.8	-	-	-
Karnataka				
Tumkur Co-operative Milk Producers' Societies' Union Ltd	39.6	58.4	55.1	49.1
Maharashtra				
Aurangabad District Co-operative Milk Producer's Union Ltd	90.1	-	-	100
Baramati Taluka Sahakari Doodh Utpadak Sangh Maryadit	71.5	75.8	73.3	72.2
Punjab				
Jalandhar District Co-operative Milk Producers' Union Ltd	72	62.7	69.2	-
Tamil Nadu				
Erode District Co-operative Milk Producers' Union Ltd	61.7	36.1	47.3	92.1
Salem District Co-operative Milk Producers' Union Ltd	73.5	81.8	71	80.2

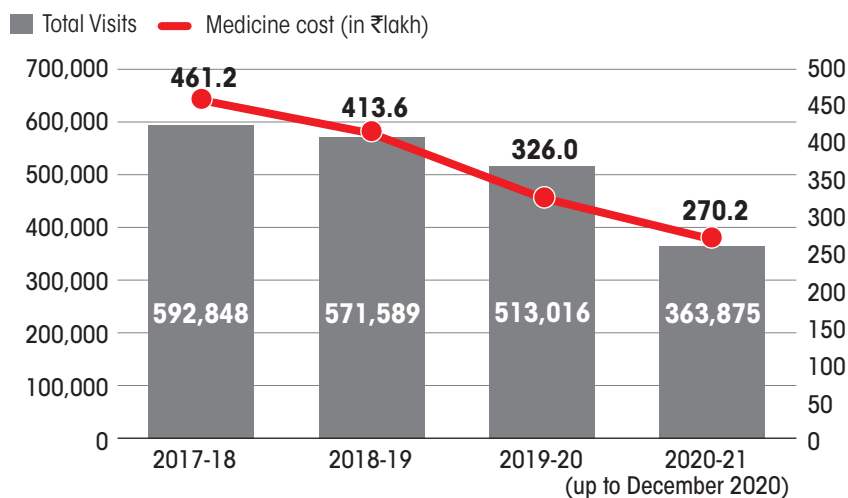
Note: *MCPP is the Mastitis Control Popularisation Programme initiated by the National Dairy Development Board;
Cure rate is percentage of the number of animals cured out of number of animals treated

Wound (in%)	Bloat (in %)	Retention of placenta (in %)	Lumpy skin disease (in %)	Prolapse (in %)	Other ailments (in %)	Cure rate (in %)
33.3	88	100	57.9		52.6	68.3
-	97.3	-	98	100	79	94.3
100	66.7	92.9	-	-	88.6	85.2
-	-	-	-	-	90.3	82.9
87.1	82.3	81.4	78.6	77.1	76.3	79.6
-	87.3	-	-	-	82.7	84
66.5	61.7	57.9	76.2	51.4	60.7	61.1
87.5	41	75.6	72.6	53.3	83	81.1
-	-	-	-	-	99.1	80.2
89.6	82.5	67.7	-	68.4	73	73.3
-	100	50	-	100	98.3	97.3
79.3	76.7	-	-	62.3	70.9	73
86.6	94.6	89.7	-	83.4	93.4	95.1
-	-	-	-	-	88	87.9
76.9	-	74.3	33.6	60.8	77.3	72.4
66.7	86.7	75.3	50	82.5	82.8	82.8
97	96.6	89.9	-	89.5	87.8	87.2
-	-	-	-	-		81.8
-	-	-	-	-		95.8
50.5	55.2	40.6	-	41.2	43	46.4
100	-	100	-	100	77.2	86
66.4	70.2	74.3	75.5	61.2	68.3	70.3
-	64.1	62.1	-	61.1	65	67.8
68.8	61.8	21.8	-	53.3	87.7	71.3
72.3	65.8	70.4	-	48.6	75.8	75.5

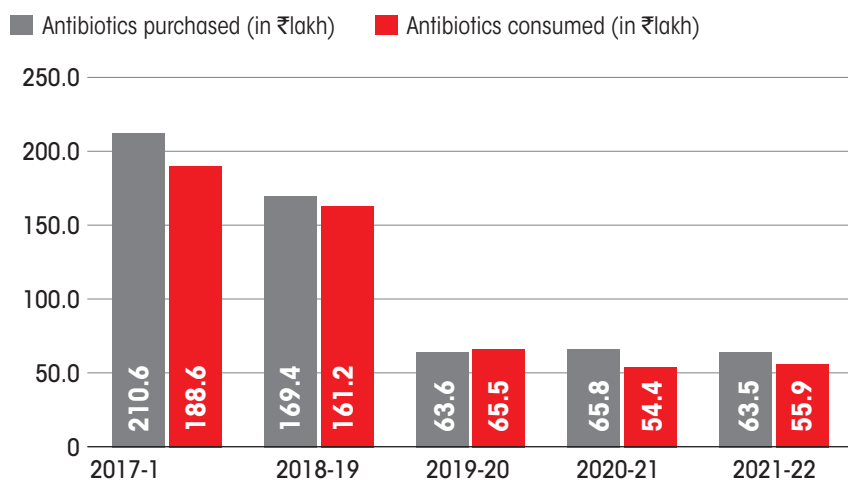
Source: Centre for Science and Environment

Twin gains of ethnoveterinary medicine

Reduction in veterinary visits 2017-21 at Sabar Dairy in Gujarat



Reduction in investment on purchase of antibiotics between 2017-22 by Sabar Dairy in Gujarat



Source: National Dairy Development Board

CSE researchers found a very high cure rate—80.4 per cent of the 780,000 cases analysed—across the ailments with ethnoveterinary medicines. Almost 80 per cent of the animals treated were suffering from ailments like mastitis, fever, diarrhoea, indigestion, wound, retention of placenta, bloat, lumpy skin disease and prolapse. Farmers usually depend on antibiotics for treating these diseases. Those suf-

fering from mastitis, fever and diarrhoea and indigestion accounted for 77 per cent of the total cases with an average cure rate of 81.2 per cent. This means four out of every five animals were cured using ethnoveterinary medicines for these four common ailments.

Of the 255,000 cases of mastitis, reported across all the 25 milk unions and producer companies, 78.4 per cent could be cured with

ethnoveterinary medicines. Baani milk producer company in Punjab and Pune Zillha Sahakari Dudh Utpadak Sangh in Maharashtra showed the highest cure rates of 96.8 and 96.6 per cent, with Kolar milk union in Karnataka showing the lowest 56.9 per cent cure rate. Similarly, 163,000 cases were treated for fever, with 82.2 per cent cure rate. Sabarkantha milk union in Gujarat and Malabar milk union in Kerala showed the highest cure rates of 82.4 and 85.2. In case of diarrhoea, 84.4 per cent of the 151,000 cases were cured. Sabarkantha milk union in Gujarat and Bengaluru milk union in Karnataka showed the highest cure rates of 85.5 and 84.2 per cent. Cure rate for indigestion was 83.4 per cent.

The efficacy of ethnoveterinary medicines has also been reported in the treatment of lumpy skin disease (LSD), a viral disease of cattle for which no cure or vaccine is available and is causing major outbreaks across the country since July 2022. Under MCPP, 3,000 cases have been treated, with a cure rate of 66.2 per cent. The Department of Animal Husbandry and Dairying now includes ethnoveterinary medicines in its treatment guidelines for LSD, released in August 2022. NDDB is also considering renaming MCPP “Disease Control through Alternative Methods”.

CHEAPER AND BETTER

A high cure rate not only indicates that the use of antibiotics could be reduced, it also ensures higher income for dairy farmers. Harish Patel, a small dairy farmer in Bhuvil village of Sabarkantha, sells his milk to Sabar Dairy. Patel also procures ethnoveterinary medicines from the village dairy cooperative society under Sabar Dairy.

To promote the use of ethnoveterinary medicines, milk unions like Sabar Dairy and Amul Dairy make packaged formulations for their farmers

"Since we began using these, the incidence of mastitis on the farm has drastically reduced," says Patel. "This medicine is extremely useful. We use it two to three times a year to treat mastitis and also after calving to improve milk output," says Kiritbhai Patel, another farmer in the village, who sells 30 litres of his daily milk produce to Sabar Dairy. "Use of these preparations have reduced treatment cost. We spend only ₹100-200 on medicines instead of ₹2,000-3,000 earlier," Patel adds.

"To scale up the use of ethnoveterinary medicines and to take it to the last mile, to the farmer, NDDB has prepared extension materials for various common ailments and is propagating those in the forms of videos, brochures, posters and mobile apps in all major vernacular languages," says Meenesh Shah, chairperson of NDDB.

Such trainings and videos have helped Gurwinder Singh, a dairy farmer from Patiala, Punjab, who sells his milk to Baani milk producer company. Singh says he is able to prepare and administer ethnoveterinary medicines without waiting for the veterinarian. "Once the plant ingredients are available, these preparations are simple to make, and require no special expertise or logistics," he adds.

Milk unions are also benefitting from the switchover. Sabar Dairy claims a notable reduction in antibiotics purchased over the past five years—from ₹2.1 crore in 2017-18 to ₹63 lakh in 2021-22. "Before rolling out ethnoveterinary medicines we were purchasing 12,000 to 15,000 vials of 30 ml sulfadimidine

and sulfamet-hoxazole-trimethoprim antibiotic injections. We no longer purchase even a single vial of it. This antibiotic has a very long withdrawal period and its residues are harmful for humans," says Samir B Patel, assistant manager, Sabar Dairy. This has helped the milk union save ₹1.91 crore on medicines, including antibiotics, non-steroidal anti-inflammatory drugs and other supplements.

Bayati says there has also been a significant reduction of veterinary calls since the milk union has started promoting ethnoveterinary medicines, indicating increased use of these preparations by farmers. Data with Sabar Dairy also shows a reduction of about 229,000 veterinary calls between 2017-18 and December 2020.

NDDB's latest annual report of 2020-21 highlights an average sav-

ings of 30 per cent in drug costs by milk unions that have seriously embarked on the use of ethnoveterinary medicines. They have reduced their medicine purchases, especially antibiotics, to the tune of ₹10 lakh per month. "Ethnoveterinary preparations provide a simple, cost effective and efficient option to milk producers for health care management of animals. It also provides an instant management option to households, devoid of the veterinary delivery system," says R S Sodhi, managing director, Gujarat Cooperative Milk Marketing Federation Ltd.

To cater to the growing demand for ethnoveterinary medicines, some milk unions and private players have also started preparing packaged formulations. "It is not possible for farmers to have access to all the raw materials all the



time," explains Hargovindbhai Patel, who works at the Banaskantha district co-operative milk producers union in Palanpur, Gujarat (Banas Dairy). "Farmers mostly tend to opt for ready-made preparations. If we tell them to make preparations themselves from raw material, they are less likely to make such effort. This is one of the reasons people choose allopathic medicine as it is ready to use," says a staff member at the Kaira feed plant of Kaira District Cooperative Milk Producers' Union Ltd (Amul Dairy) in Anand, Gujarat, on the condition of anonymity.

As of now, ready-made formulations are sold as feed supplements by milk unions and as licensed drugs by both milk unions and private players (see 'Ready-made remedies', p17). Both Amul Dairy and Sabar Dairy have set up dedicated plants, with support of NDDB, for manufacturing and selling packaged ethnoveterinary medicines in the districts they cover. Sabar Dairy manufactures different ethnoveterinary medicines for management of mastitis, fever, uterine health, improved digestion, better immunity and retention of placenta. Amul Dairy also manufactures and sells packaged ethnoveterinary medicine pouches for prevention of mastitis, improved digestion, immunity, retention of placenta, abortion and agalactia (the absence of milk production in an animal that should be producing milk). Banas Dairy has also started packaging its products. However, packaged medicines prepared by milk unions are only available at their co-operative societies and are sold at low prices for registered farmers. These are not available with local pharmacists.

Taking a step forward, the Mal-

abar regional co-operative milk producers union in Kerala has obtained a licence from the state's Drug Control Department for ethnoveterinary medicines products it manufactures under a startup, called Ethnovet MLMA. In June 2022, the start-up launched eight types of ethnoveterinary medicines products to prevent mastitis (Masticure), diarrhoea (Diar end), healing of wound (Heal all), improve digestion and bloating (Rumatore), reduce fever (Pyrexure), improve milk production in cattle (Milk let), treatment of warts or cracks in teats (Crack heal) and keeping away of ticks or ectoparasites (Fly repel). Owing to the licensing, these

products can be marketed like any other medicine. They are priced between ₹80 and ₹200.

There is also a newfound interest among private players to sell licensed ethnoveterinary medicines. For example, several unions under Punjab State Co-operative Milk Producers' Federation have been using Mastitis Malam and Must free manufactured by Trieto Biotech, which has been supplying their products to several dairy co-operatives in Gujarat since 2016.

Ayurved Limited in Delhi is another company that manufactures ethnoveterinary medicines for cattle. In 2021, a medicine called Mastirak Gel, developed by National Innovation Foundation, an autonomous body of the Department of Science & Technology, has been commercialised through the industry partner Rakesh Pharmaceuticals. It is a poly-herbal and cost-effective medicine to treat mastitis. All these medicines can be purchased at stores supplying veterinary medicines in various parts of the country.

GAME CHANGER

By now, there are ample studies to establish that the use of ethnoveterinary medicines present a way to reduce and conserve the use of antimicrobials critical for human healthcare and also provide safe milk to consumer. Ambika Prasad, Sundarban Co-operative Milk and Livestock Producers' Union, says, "We train our farmers for organic milk production, and ethnoveterinary medicines are part of the training programme." Reduced use of antibiotics in dairy farm also means lesser amount of unmetabolised antibiotics will find their way in to the dairy farm waste. Use of such antibiotic-free dung as

MAINSTREAM THE ALTERNATIVE

The ethnoveterinary approach is the low-cost, effective way to tackle bovine diseases. Here's how it can be made popular

- Develop a research agenda, promote pilot projects across states for different diseases and formulations, and publish results for greater learning and trust building among stakeholders
- Modify curriculum for veterinarians to include ethnoveterinary medicines
- Make available ethnoveterinary medicines preparations/products and appropriately regulate them for price and quality
- Make ethnoveterinary medicines ingredients/preparations available through supporting herbal gardens and manufacturing/mixing plants such as through self-help groups, local producers, community as well as small and medium enterprise
- Monitor ethnoveterinary medicines interventions and document their impact on cost, livelihood, health, antibiotic residues, reduction in AMR load



Ethnoveterinary preparations provide a simple, cost effective and efficient option to milk producers

R S SODHI
Managing Director,
Gujarat Cooperative
Milk Marketing
Federation Ltd



To promote the use of ethnoveterinary medicines, NDDB is propagating the message through videos, brochures, posters and apps in major languages

MEENESH SHAH
Chairperson, National Dairy
Development Board

manure for other agricultural farms will also prevent the inter-sectoral transfer of residues or resistant bacteria. This will add to the organic movement by being AMR safe.

A study by TDU and Tamil Nadu Veterinary and Animal Sciences University in Chennai, published in the *Research & Reviews: Journal of Veterinary Sciences* in 2017 shows that use of ethnoveterinary medicines led to a reduction of antibiotic residues in milk. Twenty seven animals infected with clinical mastitis were treated by applying ethnoveterinary formulation externally over the udder 10 times per day for seven days. Affected cows were also fed with two lemons twice daily. Post-intervention impact analysis after one year showed up to 18-49 per cent reduction in antibiotic residues. "Due to the problem of resistance, there is only 20-25 per cent cure rate of mastitis cases with allopathic therapy, but we have seen above 80 per cent cure rates for mastitis and several other ailments with herbal preparations," says Arvind Yadav, manager, Saahaj Milk Producer Company, Agra.

There is also some momentum around integrating Ayurveda and its allied disciplines into veterinary science. TDU has initiated a PG Diploma course in EthnoVeterinary

Practices jointly with Tamil Nadu Veterinary and Animal Sciences University. Some 61 veterinarians have already enrolled for the course.

"We have signed an MoU with the Ministry of AYUSH where we are not only talking about research and development on the herbal products but also bringing this education into the formal system of education in the veterinary curriculum," said Praveen Malik, former animal husbandry commissioner of the Department of Animal Husbandry and Dairying at a CSE meeting in February 2022.

The use of ethnoveterinary medicines as an alternative to antimicrobials seems promising as the country is the largest producer of milk, contributing 23 per cent of global production. For this, the Union and state governments should promote ethnoveterinary medicines among milk federations and big and small milk producers and procurement agencies through suitable policies and programmes. CSE researchers recommend a few measures to achieve this:

- Create awareness among veterinarians, para-veterinarians, farmers, milk procurement agencies, dairy collectives through training and capacity building.
- Develop a research agenda, promote pilot projects across states

for different diseases and formulations, and publish results for greater learning and trust building among stakeholders.

- Modify curriculum for veterinarians to include ethnoveterinary medicines.
- Make ethnoveterinary medicines preparations/products available and appropriately regulate them for price and quality.
- Make ethnoveterinary medicines ingredients/preparations available through supporting herbal gardens and manufacturing/mixing plants such as through self-help groups, local producers, community as well as small and medium enterprise.
- Monitor ethnoveterinary medicines interventions and document their impact on cost, livelihood, health, antibiotic residues and reduction in AMR load.
- Incentivise antibiotic-free milk or milk produced without the use of antibiotics; label such milk and milk products.
- Make consumers aware about ethnoveterinary medicines in dairy and its role in reducing antibiotic residues in milk and eventually the AMR load.
- Incentivise cattle dung not treated with antibiotics for use in crops as organic manure. **DTI**

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