A field approach to mastitis control in India

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A very good afternoon to all!

At the outset, I would like to thank the International Dairy Federation and the Government of India for giving me and the National Dairy Development Board an opportunity to present our experiences in mastitis control.

Dairying in India

Production by masses

Milk production in India is more about livelihoods than a business. Eighty five percent of dairy animal owners in the country are landless, marginal or small holders with 1 or 2 milch animals.

Only 5% of the milk producers in India own more than 5 animals. Even with this sparse distribution, milk production has been growing at an annual rate of about 4%.

The cooperative network created by NDDB links 15 million members to about 156 thousand dairy cooperative societies (DCS) at the village level, which in turn federate to 210 district dairy cooperative unions and 25 state level apex cooperatives.

A dairy farmer under the cooperative ambit pours his or her surplus milk after domestic consumption twice a day at the DCS throughout the year. This is tested for Fat and Solids-Not-Fat (SNF) percentage based on which payments are made. This milk is then transported to dairies for upstream processing. India's small holder dairy system has contributed substantially to the national milk production in the last four decades. The value of milk accounts for 65% of the livestock output and is 27% of the total agricultural output. Milk is now the single largest agricultural commodity in terms of

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value – larger than the value of rice and wheat put together, which are India's principal crops.

Mastitis- the ubiquitous scourge

Mastitis causes severe economic losses to the dairy farmers throughout the world, and the situation is no different in India. Mastitis cause annual losses of about USD 153 million (Rs.72 billion) in India as per 2009 estimates (*Bansal & Gupta, 2009*), 60% of which are due to the sub-clinical form. Since there is hardly any discernable change in the udder or in the milk, the farmer usually remains unaware of the existence of this form in his animals, which if left medically unattended, while always reducing milk production, could mature into clinical or chronic forms. The meagre income of the marginal dairy farmer is further dented if their animals are affected with any form of mastitis, especially the sub-clinical form.

Sub-clinical mastitis incidence in India

The prevalence of subclinical mastitis (SCM) worldwide is estimated to be between 15-75 percent. This seems to echo well in India with the bottom range a notch lower for the buffalo.

Clinical mastitis incidence in India

The prevalence of clinical mastitis in cattle and buffalo reported in India seem to be more or less in the same range.

The major reason for such a wide variance in prevalence range for both sub-clinical and clinical forms in the country is primarily because of the small holdings and the myriad levels of management that comes with it.

Field approach for mastitis control: Concepts

India does not have a national programme for mastitis control. A population of 80.5 million in-milk animals (cattle and buffalo) (19th Livestock Census, 2012) with its thin distribution poses significant challenges in implementation of a control programme in the field. Covering such a large population would be very difficult if one has to reach out to individual farmers directly. A level of aggregation at the village level is very essential to initiate the process. The cooperative network, which NDDB helped to set up

under the 'Operation Flood Programme' would be a good conduit to streamline the activities envisaged under a control programme.

Impetus of the control programme should be on detection and control of SCM. Controlling SCM will play a central role that will have a cascading effect of reducing the production losses and decreasing the number clinical and chronic mastitis cases.

The pooled milk samples brought to the DCS by the farmer could be the starting point to identify the animals with SCM. The farmers also need to be equipped with simple testing methods to periodically test their animals for SCM.

Once SCM positive animals are identified in the field, it is imperative that cost-effective, easily executable solutions are provided to the farmer. NDDB had previously field tested an oral supplementation regimen on a sizeable population of animals which had reduced the SCM incidence significantly.

There would always be a small proportion of animals that are chronically infected which remain the source of infection to other healthy animals. Identifying and managing such chronically infected animals is very important in controlling any form of mastitis at the farmers' homestead.

Treating clinical mastitis has always been a challenge to veterinarians, since the time of initiation of treatment and the choice of antibiotic is paramount for obtaining a higher cure rate. The conventional method of culture and sensitivity would take a minimum of three days by which time damage would be done to the affected quarter. The use of field antibiotic sensitivity kits would drastically reduce the turn-around time to under a day and help the veterinarian rationalize the use of antibiotics.

Majority of antibiotic usage in dairying is for mastitis treatment. To reduce the use of antibiotics, alternate systems of medicine should be explored. India has been endowed with several species of medicinal plants and has a huge repository of traditional knowledge for various ailments. It is very essential that we delve into this treasure trove and come up with field tested and effective remedies that help manage conditions like clinical and chronic mastitis. This would help drastically reduce the antibiotic usage and thereby residues in milk. This knowledge then needs to be transferred to the farmer

so that he is able to manage important ailments, including mastitis, at minimal cost.

From concept to field

Genesis

One of the largest milk unions in the country, the Sabarkantha District Cooperative Milk Producers' Union Ltd., with an average procurement of 2 million litres a day had deployed the Animal Health module of the Information Network for Animal Productivity and Health (INAPH)[1] developed jointly by the National Dairy Development Board (NDDB) and Infosys. Since deployment in early 2012, around 540,000 individual treatment records of the cases attended by over a 100 veterinarians of the union have been captured in the system. Of the total cases reported, 18% were udder related conditions.

Looking into the types of diseases reported under the udder related conditions, it was found that only 3.5% of SCM cases were being reported, with the majority of cases being clinical mastitis (CM) at 56% and, chronic mastitis at 7%. The union was advised to focus on detection and control of SCM in order to reduce the clinical and chronic mastitis cases. A cursory assessment by them revealed a high prevalence of SCM – far more than that was being reported through INAPH.

Convinced of the fact that detection and management of SCM is pivotal in controlling mastitis, the union solicited the help and support from the NDDB to formulate a cost-effective and feasible strategy to deal with the problem. Fifty DCS under the union were selected for implementing the project. Focus was on awareness creation, identification of CMT positive animals and their management. The pooled milk samples brought by the farmer were used as a starting point to initiate the control process. The pooled milk of cattle and buffalo are collected separately. The same sample

[1] INAPH is a comprehensive software that captures all the breeding and health activities, milk recording and, can carry out ration balancing. Data capture can be done at animal level using ear tag or at village level where numbers are recorded. This also has laboratory sub-modules to test milk, feed and pathology samples.

used for Fat and SNF testing is made use of for California Mastitis Test (CMT) which is done by trained personnel of the DCS.

Identification of farmers with SCM animals

Pooled samples positive by CMT are traced to the farmer for individual testing of animals at the farmers' homestead. Seven rounds of testing have been completed from the commencement of the programme with 62,437 CMT done at the DCS level.

Identification of SCM animals at farmers' homestead

Once the farmers, whose pooled milk is CMT positive are identified while testing at the DCS, trained personnel visit their homestead to identify the individual animal(s) with SCM by CMT. This cycle of testing of pooled milk and individual animal is completed in a span of 2 months and is called a testing round. Since there is a possibility of missing out on some CMT positive animals due to the dilution factor, especially if the farmer has more number of animals or, if the infection mild, the farmers also are equipped with simpler tests like the mastitis detection strips and encouraged to carry out the test on their animals periodically. After the seventh round of testing, 30,696 CMT testings were done at the farmers' homestead to identify animals with SCM.

Oral supplementation regimen for CMT positive animals

The farmer whose animal(s) is positive by CMT is provided with a simple, cost-effective solution in the form of trisodium citrate (TSC), which has been used in India since the late 80s. The DCS personnel provide the supplement to the farmer in 100 g sealed packs. The farmer is advised to feed 10 gms consecutively for 10 days in feed or drinking water. Since it has no off taste or flavor, the animal consumes it uneventfully. After the course is completed, CMT is repeated to assess the status and if it still remains positive, a further course of 10 days is given and the milk tested again after completion of the course.

The cost of 100g TSC provided by the union is only around USD 0.30 (Rs.20) as against USD 3.6 (Rs. 240) for branded products, making it 92% cheaper. After seven rounds of testing in the DCS, 15293 CMT positive animals have been provided with TSC.

Testing schema and identification of chronically infected animals

Animals that remain CMT positive even after two courses of supplementation are given a parenteral antibiotic course by the veterinarian along with supportive therapy for boosting udder immunity. Those animals that still remain CMT positive after the antibiotic course are classified as chronically infected.

Special instructions are given to farmers who own chronically infected animals on its management, such as, milking them last, using a separate milking machine, keeping them away from the herd, dry cow therapy etc.

Outcomes

Reduction in CMT positivity of pooled milk at DCS

The average pooled milk CMT positivity in the 50 DCS under the project has come down significantly from 55% to 20% after 7 rounds of testing and TSC supplementation.

The CMT positivity of pooled milk of cattle reduced from 60% to 25% and that of pooled buffalo milk from 49% to 11% after 7 rounds of testing and TSC supplementation.

Effect of TSC supplementation on negative CMT results in cattle and buffalo

A total of 218 CMT positive animals (161 cattle and 57 buffalo) were followed up closely to assess the CMT results after TSC supplementation. About 90% of the animals became CMT negative after the 1st or 2nd course of TSC. Buffaloes took a little more time to become CMT negative.

Effect of TSC supplementation on milk yield in cattle

The same numbers of animals were followed up for milk yield changes after TSC supplementation. There was an average per day milk production

increase of around 1 litre in most of the animals that become CMT negative after TSC supplementation. On the contrary, an average reduction of around 1 litre, especially in cattle that did not become CMT negative even after two consecutive TSC supplementations was also noticed.

Effect of TSC administration on milk yield in buffalo

The milk yield increase was more gradual in buffaloes but significant improvement in yield was seen even in animals that remained CMT positive after the first TSC regimen. The decrease in production was also not very drastic in buffaloes that remained CMT positive even after the 2nd TSC course.

Rationalization of antibiotic usage in clinical cases

Treatment of clinical mastitis is primarily through parenteral use of antibiotics. However there is no rationalization on its usage, with antibiotics freely available and new generation antibiotics being preferred. This is basically because the veterinarians avoid taking chances and go for the high end options which would cost anywhere between USD 13-30 (Rs 900 to 2000) or more per course. Field antibiotic sensitivity kits were used to cut down the turn-around time to about a day vis à vis 2-3 days required for the conventional method. This has also helped in reducing the treatment cost for a course to around USD 1.8 (Rs.120) by identifying cheaper antibiotic options. The cost of kits is around USD 2.25 (Rs.150) for five antibiotics with an amount of USD 0.38 (Rs.25) per any additional antibiotic requirement.

Promoting alternate systems of medicine

Institutes like the Tamilnadu Veterinary and Animal Sciences University, Chennai and the Transdisciplinary University, Bengaluru, promote ethnoveterinary medicine (EVM) for managing many conditions in animals including mastitis. These remedies are cost-effective, easily available and easy to execute at the farmer's premises. EVM for managing clinical mastitis was initiated in the union with very encouraging results. After initiation of EVM in June'16, anecdotal evidence from around 700 cases in the union

has reported a very high cure rate without the use of any antibiotics. A percentage of these cured cases also had been unresponsive to antibiotic therapy. Buoyed by the results, the union has already set up a demonstration plot of medicinal plants for propagation and provided 4000 saplings to farmers. A great potential is therefore envisaged for using EVM in management of clinical mastitis since this would greatly reduce the usage of antibiotics and its residues in milk. Knowledge transfer of EVM to farmers would help him manage mastitis at minimal cost.

The way forward

Improving productivity and milk quality

With globalization being the rule of the day and newer markets opening up for milk and milk products in its wake, it is imperative for the milk producing institutions aspiring to join the fray that they conform to the prescribed limits for antibiotic residues and other parameters. It is only a matter of time before authorities governing domestic dairy trade would impose restrictions on such parameters in milk and milk products.

It is paramount that holistic mastitis control programmes are implemented to address the whole gamut of issues namely SCM, antibiotic residues, bacterial load, somatic cell count etc, and, most importantly, translate the same into simple, cost effective tools and practices which the farmers can easily adopt. Farmer conviction and his first-hand experience would ensure that he would continue to follow these practices in future.

Taking a cue from the results in Sabarkantha, another district milk union more than 2000 kms away in Kerala, had conducted a similar screening of around 11400 pooled milk samples from 300 DCS by CMT during May 2016 followed by supplementation of trisodium citrate to CMT positive animals with around 62% becoming CMT negative after the first supplementation. A roadmap is also being planned by NDDB to take the preventive model of control to all the milk unions in the country that are providing veterinary services.

A study on the project by the Institute of Rural Management, Gujarat showed that around 90% of farmers in the 50 project villages were now aware of subclinical mastitis. A cost-benefit ratio of around 1:8 was also estimated. This truly highlights the relevance of such programmes in the Indian context.

We sincerely hope that these small strides in mastitis control gather momentum and are taken to a larger canvas which will have an overarching impact on the livelihood of the marginal farmer, the quintessential milk producer of India.

Thank you for your attention.

Have a nice day!