



On-farm reproduction

management in bovines paid big dividends

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ICAR-CIRC, Meerut executed the FFP programme among the selected 972 households across three village clusters in the Meerut district of Uttar Pradesh. The selection of the project villages was done on the ground that they had huge potential in dairy sector where the farmers only sow wheat and sugarcane. There were three interventions, viz. reproduction management in dairy animals via assisted reproductive technology, therapeutic and preventive strategies for mastitis control in dairy animals, integrated farming system, value addition of milk and milk products, and better market linkages. This article highlights the success cases of these three interventions executed in FFP villages.

Keywords: Dairy, Integrated farming system, Meerut, Value addition

UNDER the Farmers FIRST Programme (FFP) the project “Livelihood Improvement through Sustainable Dairy Farming using Suitable Interventions” was started at ICAR-Central Institute for Research on Cattle, Meerut Cantt, in the year 2016–17. Based on location, population of farming community, feasibility of regular follow-up, response of Gram Pradhan and progressive farmers, perception and problems faced by the farmers pertaining to agriculture and livestock sector 18 villages were screened around Meerut and out of them the three villages were selected for the implementation of the project were Jhitkari, Chhabadia and Chandna.

The rationale behind selection of the project villages is the huge potential in dairy sector where the farmers only sow wheat and sugarcane. The area is rich in all natural resources including adequately abundant in irrigation facility, however resources have been underutilized due to lack of knowledge about scientific livestock farming, integrated farming and value added products to get enhanced income in dairy business. The villages are about 28–30 km from ICAR-CIRC and therefore the FFP team could pay more visits for necessary interventions in the said villages.

The major objectives of the project were to assess the productivity of cattle and buffaloes and its impact on integrated farming system; execute scientific dairy farming and herd management interventions for technology demonstration, application and human

resource development; promote clean milk production, processing, post-harvest technology and market linkages in dairy enterprise and demonstrating the livestock waste management and vermicomposting.

Interventions planned and implemented

This project targeted and intervened on four basic modules given here.

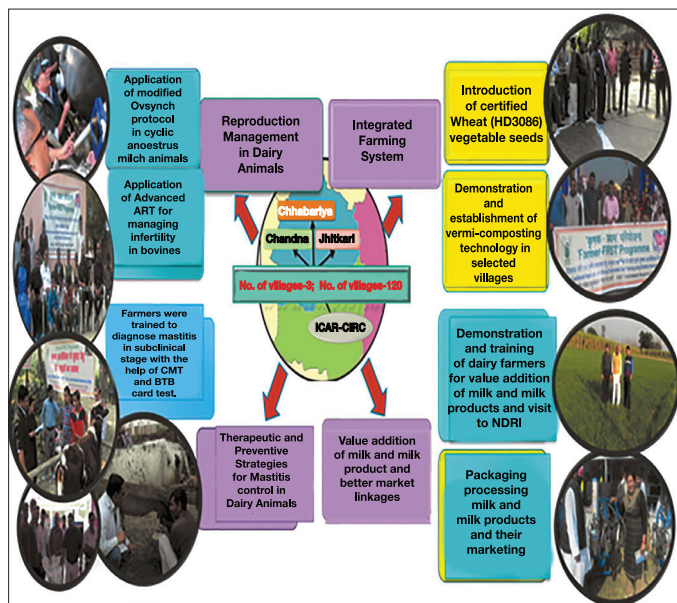
- Reproduction management in dairy animals via Assisted Reproductive Technology
- Therapeutic and preventive strategies for mastitis control in dairy animals
- Integrated farming system
- Value addition of milk and milk products, and better market linkages

Performance of the selected module

The interventions carried out in this project were target specific and as per the need of different category of farmers. The module wise interventions and the success stories are as follows.

Intervention 1: Reproduction management in dairy animals via Assisted Reproductive Technology (ART)

Rationale of Intervention: The main aim was to increase production through efficient reproduction. Estrus synchronization can be a boon to dairy farmers that maintain breedable females. The application of this assisted reproductive technique enables the livestock farm owner to have calving at the desired time with



Modules and interventions undertaken in FFP, ICAR-CIRC, Meerut

uniformed weaning and bulk milk production during lean period. The above protocol also minimizes the time and money that gets lost due to missed heats or sub-estrus or overt estrus. It also reduces the costs involved in calling inseminator.

Outcome: Mr. Chandra Bose ji of village Jhikari, Sardhana, Meerut (27 km away from ICAR-CIRC) thrived on a small dairy farm maintained by him. He had maintained a total of 20 bovines (cow and buffaloes). However, the overall low productivity (63 litre milk/day) of the milch animals was irritating him due to which he became dismayed towards the dairy business. When we enquired and examined the situation, it was realized that the average calving interval in the herd was 19 months. Considering the benefits of ART, a therapeutic experiment was conducted on his herd.

All the animals were regularly monitored per rectally and ultrasonographically. The animals were suffering with various reproductive problems like anoestrous (n=5), follicular cyst (n=1), persistent corpus luteum (n=1) and repeat breeders (n=6). Clinically, herd appeared healthy however the plasma levels in blood showed deficiency of micro minerals necessary for efficient reproduction. The animals were given anthelmintic

(@10 mg/kg body weight) followed by regular mineral supplementation. We selected oestrus synchronization using PGF2 α -GnRH-PGF2 α -GnRH regimen to improve his herd fertility (n=13) along with micro minerals supplementation and fixed-time artificial insemination (AI). The cow with follicular cyst and luteal cyst were additionally given GnRH (5 ml, Buserelin acetate, IM) and PGF2 α (500 μ g, Cloprostenol sodium, IM) respectively, 11 days prior to the experiment. On day 0, PGF2 α (500 μ g, Cloprostenol sodium, IM) was administered, followed by GnRH (5 ml, Buserelin acetate, IM) on day 6. Thereafter, second injection of PGF2 α (500 μ g, Cloprostenol sodium, IM) was given on day 13th, followed by second shot of GnRH (2.5 ml Buserelin acetate, IM) on day 16th. Subsequently, fixed time artificial insemination (FTAI) was performed twice at 72 h and 84 h post second PGF2 α shot.

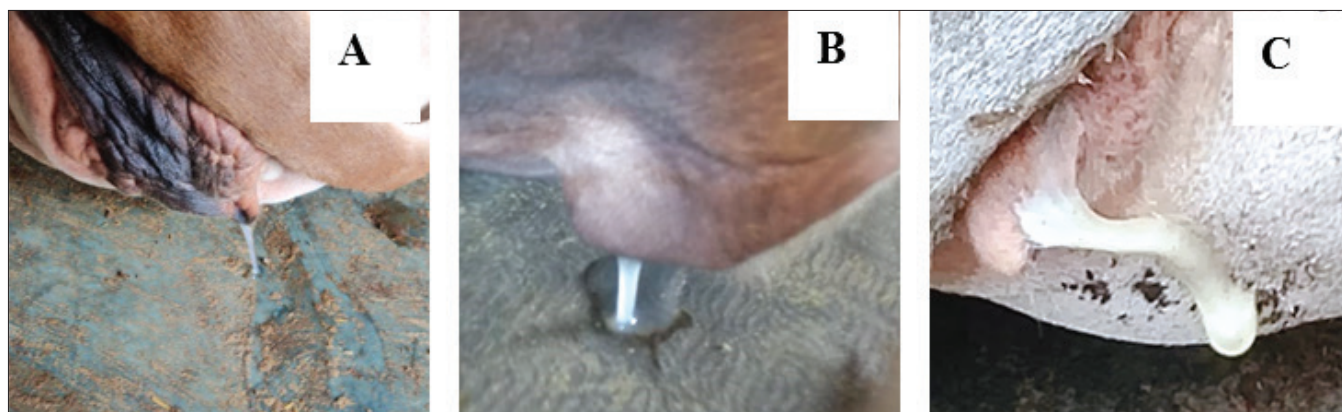
The estrus was induced in 10 out of 13 (76.92%) bovine. The pregnancy diagnosis was done 90 days' post FTAI and 8 out of 13 (61.54%) were found to be pregnant and later calved. Prior to the experiment the average milk production in his herd was 63 litre/day. After ART application and subsequent calving's, the average milk production boosted and reached a milestone of 103 litre/day. He earned a net gain of ₹34,950 (Table 1) on monthly basis. He was very contended with scientific interventions and became an exemplary for other dairy entrepreneurs.

Intervention 2: Management of uterine infection associated with Repeat Breeding Syndrome in bovine

Rationale of intervention: Repeat Breeding Syndrome (RBS) associated with sub-clinical uterine infection

Table 1. Gains before and after intervention 1

Parameter	Before intervention	After intervention
Total number of animals	20	25
Lactating animals	9.00	11.00
Milk production/day (litre)	63.00	103.00
Monthly expenses (₹)	61500.00	74550.00
Monthly returns (₹)	75600.00	123600.00
Monthly gain (₹)	14100.00	49050.00
Additional income/month (₹)		34950.00



Cervical mucous released at oestrus in bovines suffering from uterine infection associated repeat breeding syndrome (A, B and C depicts mucous character score of 01, 02 and 03, respectively)

Table 2. Gains before and after intervention 2

	Before intervention	After intervention
Milk production/day (litre)	5	21
Monthly expenses (₹)	5800	11000
Monthly returns (₹)	6000	25200
Monthly gain (₹)	200	14200
Additional income/month (₹)		14000
Monthly gain (₹)	14100.00	49050.00
Additional income/month (₹)		34950.00

was one of the major reproductive problems faced by livestock owners of our selected villages. We selected 78 RBS affected bovines in which the cervical mucous (CM) was collected for study of its characteristics, white-side test, endometrial cytology, microbial examination and antibiogram. The treatment protocol was developed and the animals' response to the treatment was assessed.

Outcome: Mrs Sanju Devi, wife of Shri Pradeep Chandra of Chhabaria village was rearing two cows from last 13 months. Both the cows showed regular oestrus but did not conceive. The cervical mucous character examination, endometrial cytology and white-side test revealed that the cows were repeat breeder with uterine infection.

The microbial examination revealed the presence of gram negative *bacilli* and *Escherichia coli* infection. Antibiogram studies recorded the response of Tetracyclin as best followed by Cephalexin, Chloramphenicol and Streptomycin. The RBS/UI+ve cases were treated obeying antibiogram. The infection was considerably controlled and both the cows conceived following intervention. The cows subsequently calved and started lactating. Prior to the experiment, the total milk production was 5 litre/day. After successful diagnosis and efficient approach of therapeutics using antibiogram studies the total milk production was increased to 21 litre/day following



Repeat breeder cow calved successfully

calving. She earned a net gain of ₹14,000 (Table 2) on monthly basis.

SUMMARY

The experiences of the success cases revealed that the breeding disorders have reduced the productivity of cattle and thus the true potential of dairy has not been realised. Implementation of the interventions helped farmers increase productivity to a great extent. The timely interventions for heat detection and supporting services are essential. The interventions demonstrated successfully ought to be outscaled by the concerned line department.

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Emetine can be repurposed to treat COVID-19

Emetine is a FDA-approved drug, which is used to treat amebiasis, a parasitic disease. It is commercially available in both tablet and injectable form. In initial cell culture-based study, emetine treatment decreased ~10,000-fold SARS-CoV-2 (both alpha and delta variants) titres in Vero cells. Based on these encouraging results, antiviral efficacy of emetine against infectious bronchitis virus (IBV, also known as chicken coronavirus), was evaluated. Emetine completely protected chicken embryos against lethal challenge with IBV.

Mechanistically, it was demonstrated that emetine interferes with the synthesis of viral proteins without inducing any toxicity (side effect) to the host cells. In order to stop synthesizing viral proteins, emetine inhibits binding of eIF4E (a cellular protein required for the initiation of protein translation) to the viral mRNA. Further, molecular docking and molecular dynamics simulation studies suggested that emetine may bind to the cap-binding pocket of eIF4E, in a similar conformation as m7-GTP binds. In summary, a potent antiviral efficacy against SARS-CoV-2 in the cell culture, ability to protect chicken embryos against lethal IBV infection, together with molecular docking and molecular dynamics simulation studies suggested that emetine could be repurposed to treat COVID-19.

Source : ICAR Annual Report 2021-22