

# INDIAN DAIRYMAN

THE SPIRIT OF THE DAIRY INDUSTRY

## BULLETIN

India is Well Poised to Emerge as a Leader in Dairy: Shri Parshottam Rupala  
National Milk Day Celebrated throughout the Country

## INDIAN DAIRYING

Dairying through Small Holder Systems  
– A Lifeline for Millions

## PROCESSING

Sustainability in Milk Processing



## FROM THE PRESIDENT'S DESK

Our Expectations from Budget 2023







**INDIAN DAIRY  
ASSOCIATION**

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# CONTENTS



**10**  
**FROM THE  
PRESIDENT'S DESK**  
Our Expectations from  
Budget 2023

**36**  
**INSTITUTIONAL MEMBERS  
OF IDA AND OFFICE  
BEARERS**  
Editorial Board, Central,  
Zonal, State Chapters and  
Local Chapters

**38**  
**MARKETWATCH**  
Fresh Pouch Milk MRP,  
Wholesale Raw Milk, SMP  
and Ghee Prices.  
International Dairy Market  
Information

**40**  
**BULLETIN**  
IDA (Eastern UP Local  
Chapter) Organizes a  
National Seminar in  
association with Department  
of DSFT, BHU

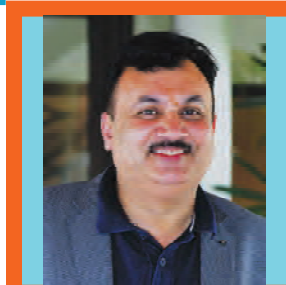


**46**  
**BULLETIN**  
India is Well Poised  
to Emerge as a  
Leader in Dairy:  
Shri Parshottam Rupala



**50**  
**BULLETIN**  
Global Dairy Production  
and Trade Trend - 2022

**68**  
**DAIRYING THROUGH SMALL  
HOLDER SYSTEMS - A  
LIFELINE FOR MILLIONS**  
Amit Vyas  
MD, Amul Dairy



**97-98**  
**NOMINATIONS INVITED  
For Dr. Kurien Award,  
Patronship and Fellowship**

**99**  
**PRESERVATION OF  
FORAGE AS SILAGE FOR  
ANIMAL FEED**  
Ravi Prakash Pal, Ranjit  
Singh and R.S. Sohu



First Author

**102**  
**PROTECTIVE CULTURES:  
PROMISING FOOD  
BIO-PRESERVATIVES**  
Manju G. and  
Devastotra Poddar



First Author

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# Dairying Through Small Holder Systems - A Lifeline for Millions\*

Amit Vyas

**Amul dairy has been a lifeline for millions of farmers associated with it since last 76 years. It is an apt example of how cooperatives also can be a role model for development adopting technological interventions and out-of-the box strategies.**

**Some of the significant technological initiative Amul is planning to implement are DCS constructed on Green building concept, use of LNG as fuel in its tankers which will reduce 15 % total cost of ownership, Captive Solar Plant connected to DISCOM, establishing solar based economical farms without batteries, use of bio-fuel and bio-fertilizers, and promoting individual bio-gas backpacks at field level, and use of mobile microscope for quick disease diagnosis.**

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\* The author had presented his paper during the IDF World Dairy Summit 2022 in Delhi (NCR).

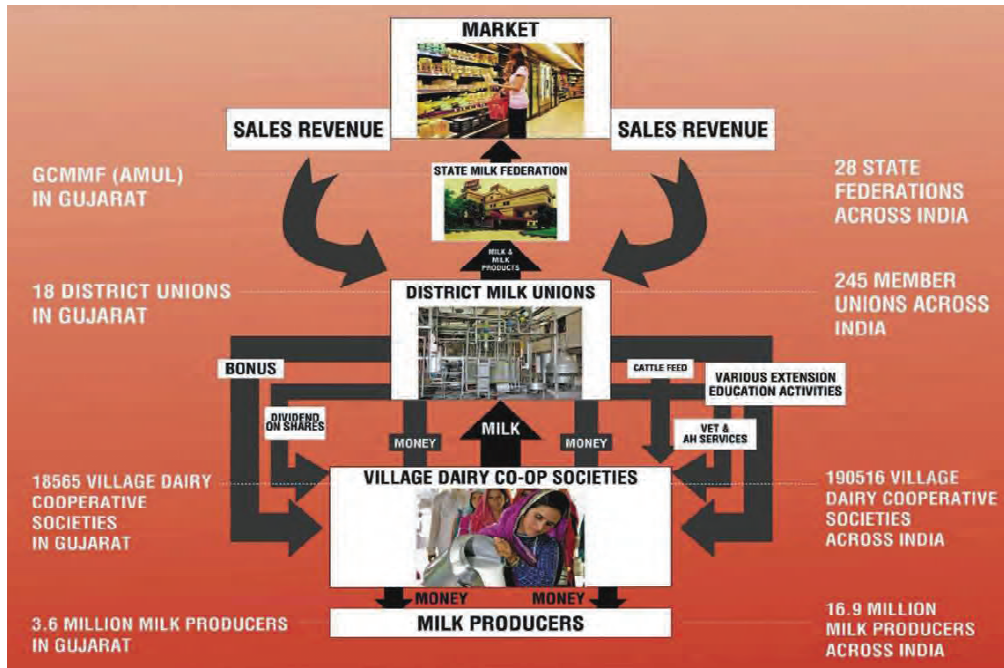
Dairy in India is not a profession but an important means of livelihood for millions of small and marginal farmers, most of them with little land holdings. Indian dairy industry has grown from 163.7 Million Metric Tons in 2016-17 to 209.96 Million Metric Tons in 2020-21, with a CAGR of 6.2%. The total production of milk and dairy products in India is 22% of global production, followed by the United States of America, China, Pakistan and Brazil.

The demand for dairy products in India increasing persistently among rural and urban populations. About 40% of cattle milk comes from smallholder cattle farms with an average herd size of 1-2 milking cows, whereas 30% is from farms with 3-10 milking cattle. Only 10% of farms have a strength of 30-100 dairy animals, which indicates need of designing strategies towards increased milk production per animal, not for increasing number of milch animals. The major challenges, Indian dairy farmer faces are *viz.*, small land holdings, aging labour force, genetic potential of animals, availability of balanced nutrition, seasonal disturbances in fodder production, animal health management, scarcity of authentic data, poor extension, and sustainability. Milk yield per animal, total cost of milk production, farm gate prices, and demand of milk products are the major drivers which shape dairy industry in India. The Indian dairy market is expected to grow at a CAGR of 14.3% by 2026, which indicates huge opportunity of growth and scale up. The increase in per capita consumption of dairy products will result from various influencing factors like more disposable income, health awareness, demand for more protein consumption and easy availability of milk and milk products.

The Cooperative system has by far ascertained to be most apposite system for sustained milk production and to overcome the challenges farmers come across in most scenarios.

Amul dairy has been a lifeline for millions of farmers associated with it since last 76 years. It is an apt example of how cooperatives also can be a role model for development adopting technological interventions and out-of-the box strategies. Amul has been instrumental in ensuring uninterrupted supply of milk and milk products across the country, even in the tough COVID times. Continuous milk procurement, uninterrupted milk supplies, and steady income to dairy farmers, achieved through professional management, automation and advanced technology embarks the importance of cooperatives like Amul.

The cost of milk production defines the competitiveness of dairy farmers worldwide. Initiatives at field like recording of animal health, feeding practices, breeding,



software using a scanner through mobile. These are used as Adhaar number of animals while doing AI, PD, calving, treatment or any other breeding activities. This confirms accurate and authentic recording of animal related activities and thus provides us a highly efficient tool for designing future strategies.

Automatic milk collection system (AMCS), implemented at Amul since 2017, presents a perfect example of digital revolution. It connects all three stakeholders, farmers, the village co-operative societies and the milk unions, on a single digital platform.

disease prevention activities through animal identification aid to monitor and implement technologies like milking machines, Sexed Semen and Embryo transfer for breed improvement, use of rapid diagnosis kit, treatment through homeopathy and EVP, fodder crops and digitalization of systems. Alternative resources like in-house bio-gas plant, application of solar panels and use of Bio-fertilizers control cost along with generating additional income, necessary to contain withdrawal of youth. Amul has been successful in implementing many such state-of-the-art technologies to enable its farmers not only sustain their livelihood even in tough times, but also to envision beyond just survival, essentially paving aisle to be followed and replicated.

the village co-operative societies and the milk unions, on a single digital platform.

It captures all activities of Societies like accounts, sales, stock, purchase etc., while capturing of quantity and quality parameters. Payment of milk is based on captured parameters & the farmers are instantly informed of the same through SMS. The entire data is stored on central server at the Federation level. For the monitoring, 'MU mobile app' is for Union officials, 'VDCS mobile app' is for Society authorities, farmer mobile app is for farmers, and kiosk for farmers is also there at Society Building. All payments are done directly to the farmer's bank account. Over and above, all milk rate and other related circulars are published through the central server, and thus reach individual farmers without delay and distortion. The application has certified transparency and trust because of ease of access to own data by farmers

Data can be an unmatched weapon for control, planning and future action plans, only if it is accurate and reliable. Appreciating the strength of accurate and online data, Amul has digitalized most of its operations, from producer to consumer. This live data is providing milk producers' the potential to obtain key information with the click of a button, and thus to make smarter day-to-day decisions to improve cow health, production and on-farm efficiencies. All animals are tagged for identification and the tag numbers are registered online in a





with only one click.

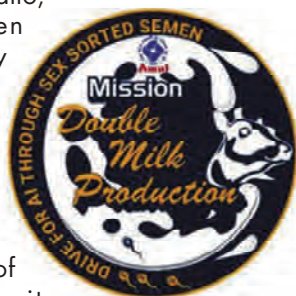
As another stout step towards quality improvement using technology, we have installed automatic Milk-o-tester, the automatic fat and SNF machines at society level which detects the fat & SNF %age to a level, and due to online central calibration, farmers can be assured that the milk displays accurate milk parameters and is free from any adjustments due to manual intervention. It has resulted in improving quality of milk, increasing profitability of society and Dairy, and helps in having safe milk for consumers. This has resulted in reduction of water reflecting in about 5-10% increased TS, thus reducing the transportation, processing and utilities charges to a huge extent, while ensuring highest quality milk for our consumers.

The data which is thus captured at each level of operations at field level and plant level is then available in form of dashboard to the Management, a window which acts as master file for analyzing the growth of organization as well as planning for upcoming years.

Livestock are the biggest asset for Amul, and more like a family person for its farmers. Amul constantly implements new and path breaking interventions for ensuring the breed, health and productivity of its livestock population. While the average milk yield of India's dairy herd is low compared with more advanced dairy economies, many indigenous breeds are capable of improved yields, and also carry beneficial traits in the form of disease resistance and the capacity to successfully digest available, relatively low-quality forages native to the region. Looking into same, breed improvement is an important agenda in the to-do list of Amul dairy. Embryo transfer (ET) has proved to be a powerful technology in genetic improvement of farm animals, primarily to propagate the genes of females of superior pedigree. Amul started with ET since March 2021 and has done highest Embryo Transfer in single year in India, *i.e.*, 1125, with an efficiency of 30%. Amul has also started ET in buffaloes, which if successful, will be a colossal milestone for dairy industry.

With the online data we received in our system, we found that the ratio of male-female calves born from artificial insemination is about 60-40, which puts huge economical pressure on the dairy farmers. To

increase the female calf birth ratio, we adopted sexed semen technology for AI for the dairy cattle of our functional area, since 31<sup>st</sup> October' 2020. We have also installed a first of its kind in India, an on wheel-Sex Sorting Mobile Lab for production of sexed sorted semen straws of high genetics. To make it



**Monozygotic Twins through ET**

economically viable for our farmers, we are providing the sexed semen straws at a highly subsidized rate of Rs. 50/-, and the results in the field are highly encouraging. By now we have done about 2.73 lakh AI with sexed semen at field, and the birth ratio of female calves is above 87%, which is remarkable and the farmers have accepted the new initiative with open hearts. By the end of year 2022-23, we will surely establish a benchmark in Indian dairy industry. More females mean more milk and thus, it is assuredly an ardent step towards our mission of doubling of milk production in next four years.

Use of antibiotics for animal treatment is a big issue of concern across world. Being a conscious dairy, we have started shifting animal treatment towards Ethnoveterinary practices, which are cost effective, easy to avail and have no adverse effect on milk. Moving one step ahead, we also experimented with extensive use of homeopathy and found it to be extremely effective, in just about one-third of cost. We have also developed 20 different homeopathic preparations, along with an organic spray for prevention & control of ectoparasites like Ticks, lice, bugs and flies, the results of which are exceptional of field. Now we will soon come up with a new plant for homeopathic drugs, whose patent also we have filed for.

When it comes to measures taken towards increasing productivity of dairy cattle, nutrition emerges as the second most critical factor after breed, and a highly productive animal also requires optimal nutrition in order to meet our expectations. Balanced nutrition is essential for all livestock, but especially high-yielding animals, which often require more than moderately producing animals. Looking to the importance of quality and balanced nutrition, Amul has been making quality and fortified cattle feeds, supplied to its dairy farmers at a highly subsidized rates, to ensure better health, immunity and productivity of animals. Fortified with 2% mineral

mixture, the cattle feed of Amul caters to the nutrition requirement of dairy cattle at each stage of life, specially milking. Looking upon the benefits found during the trials, we are now starting with production of Total mixed ration (TMR). The productivity of animals increased by 12%, with significant increase of ROI by 36% due to improved milk quality.

For animal health, proper and timely diagnosis of disease is mandatory. This is where the rapid diagnosis kit for FMD, Brucella and Tuberculosis come handy and are used by Veterinarians at Amul on field.

Mastitis prevention program is another feather of the initiatives Amul is taking for the benefit of farmers, started in about 1000 DCS. Mastitis is the most crucial disease negatively impacting productivity of dairy animals. To check sub-clinical mastitis, we have mobilized a trained manpower of village resource persons (VRP) on field, who continuously test and monitor the cases where SNF is less in the milk or problem with milk letdown is seen. Another step towards animal health as well as women empowerment is to introduce local women as VRPs, where they can ensure quick diagnosis and treatment of mastitis, but also get employment. Automatic milk analyzer ensures digital detection of SCC count at DCS level, thus giving highly accurate and fast data for VRPs to act upon sub-clinical mastitis.

This is an era of health consciousness and fitbits are the latest trend. So then why should animals also not benefit from the latest fad? So now, about 5200 cattle of our area are now wearing their fitbits, *i.e.*, digital neck belts. These belts are also linked with mobile app & web based application. These belts track animal health & heat, and send SMS alert of animal health, heat and stress. This is the best example of IoT where we come to know if the animal is going to be sick two days before

they actually becomes sick. Now this leads to better preventive care, better productivity and timely AI thus minimizing chances of missed heat. This will be the breakthrough technology for entire dairy Industry in India.



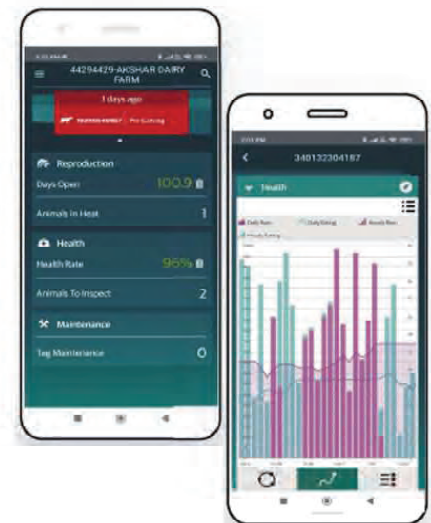
Few other and significant technological interventions we have implemented are use of digital thawing machine to ensure AI is done with straw at right temperature, trials are on for use of digital AI gun to ensure semen deposition at right place, and using pregnancy diagnosis kit through which we can detect pregnancy as early as at 28 days. As a model of entrepreneurship, we have started milk-o-bike for small dairy farmers who cannot afford huge milking machines.

To keep the farmers updated with the best dairy practices and emerging technologies adopted by dairy, we provide continuous training in well-designed format through our trained staff to the dairy farmers. This enables them to understand, appreciate and implement the new initiatives with full confidence and agreement, to reap maximum benefits.

While being aggressive in its operations to ensure maximum benefits for its producers, Amul has always remained conscious towards environmental safety and energy efficient operations. Sustainability and reducing carbon footprints have always been on priority list for Amul. We have taken numerous steps towards sustainability, installation of Bio-gas being one of them.



**The Digital Neck Belt and Display on Mobile with Graphs**





# INDIAN DAIRYING

## Bio-gas generation at plant - Stored in Balloons and Used in Plant

Milk producers are encouraged to install bio-gas plant at their farm for improving efficiency of manure management. The solid waste from canteen and cow dung cake, wherever available, is converted into bio-gas and stored in balloon and supplied to nearby farmers for cooking. As our next step towards sustainability, we will soon be installing about 600 bio-gas plants at our villages.



The future lies in these alternate sources of fuel and thus we are looking forward to adopt model where bio-gas can be bought by the farmers on daily basis in form of small balloons or backpacks, a revolution which will be a blessing for the farmers.

We also organize tree plantations regularly at dairy plants, DCS & farmer's levels. In 2021, a total of 91.60 million saplings were planted which is almost 50% increase in past 5 years.

## Bio-gas in Backpacks - The Future of Sustainability

villages. This has significantly increased the ground water in our premises. By adopting to mobile rain gun for irrigation, 50% water is saved due to its rain like water spread technology.

At Amul, we installed 2 prototype solar operated BMCs at society level that enables us 30-40% savings in monthly electricity consumption. This will very soon be extended to other DCS also. We are also working on a



**Tree Plantations (In Millions)**

At Amul, we installed a fully automated bio-CNG generation and bottling plant to utilize energy from its plant's waste and is able to reduce about 90% of Green House Gasses (GHG), conservation by use of natural gas for operation to the extent of 1300m<sup>3</sup> per day and water conversion by 2000 m<sup>3</sup> per day as treated water is utilized gardening/irrigation through this easily replicable model. We have also installed total 79 Rainwater Harvesting systems are installed across 8 locations, and very soon will be extending them to our

different solar initiative that is called 'hybrid solar thermal collectors' which will be incorporated with the refrigeration system of BMC and use the solar energy when the sunny days are there. We developed a prototype containerized BMCs, a ready to use solution which has facility of fully furnished office of a DCS.

Amul has entered in market with organic fertilizers, rich in Humic acid and organic Carbon, to intensify the farm yield of farmers by multifold, but also to boost the



Organic Fertilizers by Amul



Launching of Amul Liquid Fertilizers

efficiency of water used to render crops more resilient and drought-resistant. We have already sold more than 5000 mtr. ton of organic fertilizers, marking the trust and efficiency of these products on field. We have also launched Organic wheat flour and pulses, and ready to venture in organic food sector as our next gigantic step toward environmental sustainability. Recently, Amul also launched a range of 9 different liquid bio-fertilizers like bio-NPK Consortia, enriched with Micro Algae and Amino acid. The future of agriculture lies in farming with bio-fertilizers and organic fertilizers, thus taking the country neck-to-neck with the crop rich countries across world.

Some of the other significant technological initiative Amul is planning to implement are DCS constructed on Green building concept, use of LNG as fuel in its tankers which will reduce 15% total cost of ownership, Captive Solar Plant connected to DISCOM, establishing solar based economical farms without batteries, use of bio-fuel and bio- fertilizers, and promoting individual bio-gas backpacks at field level, and use of mobile microscope for quick disease diagnosis. As we have bred for ever more efficient and productive cows, scientific research & technology has to follow suit, exploring the best ways to manage the animal and shaping best practice guidelines.

consumers, but also keeps them in state of good health & happiness. During Covid, we came up with immunity milk range, for diabetics we have camel milk, cheese lovers can relate to our revived form of Emmental, Gouda & Feta cheese, range of protein fortified drinks and cookies is under trial for the health conscious youth, for those who like natural products is the new organic range Amul is coming up with.

India is the largest producer of milk and dairy products in the world and to ensure that the youth stays in the dairy profession, it becomes important to mobilize efforts to reduce the cost of processing, increase the productivity of dairy species, and institute better health care and breeding methods, along with induction of latest technologies & digitalization. Amul has always been a leader, however in its 77<sup>th</sup> year of foundation, Amul still thrives to imbibe new technologies and latest digital applications to overcome the stalling factors of dairy industry and mark the way towards India being the leader in dairy industry across world, not only in total production but also in milk yield per animal.



Future Initiatives of Amul

Apart from the procurement, animal health & breeding, sustainable and cost efficient operations, our R&D team continuously comes out with different value added products, which not only titillate the taste buds of

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