



CHAPTER XXII

DAIRY DEVELOPMENT IN INDIA

During the last three decades, our nation's milk producers have transformed Indian dairying from stagnation to world leadership. During this period and before, science and technology (S&T) have played a critical role in supporting our farmers efforts. During the next decade, that role will be further enhanced as we face a number of new challenges.

The dairy cooperative movement has been central to the development of dairying in India. The inspiration for this movement was the success of the Khaira District Cooperative Milk Producers' Union -- better known as Amul. Founded in 1946 in response to the exploitation of district's dairy farmers, Amul grew rapidly from its initial base of two

societies and two hundred litres of milk. That growth, however, posed a challenge that threatened its existence: flush season production of milk exceeded the demand. Yet the cooperative's success depended on accepting the farmers' milk year round.

At that time the advanced dairying nations conserved milk by conversion into powder and butter. This could either be sold as products, or combined with fluid milk to extend the supply during the lean season when demand outstripped production. Experts from the North pronounced buffalo milk as unsuitable for conversion into powder. It couldn't be done, they said. This provided the opportunity for the first major Indian scientific and technological breakthrough. The Amul staff, led by the then General Manager; solved the

problems by producing powder from buffalo milk. It would not be an exaggeration to say that this advance in the technology saved Amul and, with it, ensured the future of the as yet unborn Indian dairy cooperative movement. Today it is one of the most successful and the largest cooperative dairy enterprises in the whole of Asia.

Since that time, S&T have produced a large number of breakthroughs that have been critically important to the



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development of Indian dairying. A wide variety of institutions have contributed including the National Dairy Research Institute, Karnal, agricultural universities, veterinary colleges and, proud to say, the National Dairy Development Board (NDDB).

At the foundation of our dairy industry are the cows and buffaloes that produce most of our milk. India does have some excellent breeds. Among cattle, the *Sahiwal*, *Rathi*, *Gir* and *Red Sindhi* stand out as milk producers; for the buffalo, pride of place goes to the *Murrah*, *Mehsani* and *Jaffarbadi*. However, these recognized and superior breeds represent but a very small, though valuable, part of our national milch herd. The majority of our animals are nondescript with limited genetic potential.

The most efficient way to improve the potential of our nondescript cattle and buffaloes is through artificial insemination. It was only in the mid-1940s that a major breakthrough was made in this field with the use of antibiotics to ensure that semen would remain viable. Since that time, major advances have been made in semen extension, cryogenic preservation and distribution. Today, NDDB supports this effort through 14 Bull Mother Farms that produce and supply exotic breed bulls to semen stations throughout India. NDDB also directly supports 11 semen stations and has financed a network of 10,556 artificial insemination centres that annually deliver 5 million semen doses to cattle owned by members of 20,000 dairy cooperative societies.

Good genetic potential cannot be realized without good nutrition. In India we face an important challenge: ensuring adequate nutrition for our animals without competing with man for available land and agricultural commodities. The

solution has been reliance on crop residues and byproducts. Working with Australian scientists, NDDB has developed several innovations that enhance nutrition directly and by improving digestibility and palatability: urea molasses blocks and urea treatment of straw both improve the diets of our dairy animals and help reduce the methane released into the atmosphere.

NDDB has also supported animal nutrition through the financing of 46 cattle feed plants and supporting these plants with quality control laboratory services. A useful innovation has been the

development of protected feed technology which minimizes the degradation of protein and fat in the rumen. Mineral deficiencies are also a constraint to improved animal productivity. NDDB is supporting area surveys resulting in profiles that lead to targeted mineral mixtures to be used as supplements in cattle feeds sold to farmers in these regions.

Last, but not least, animal diseases cost our nation's milk producers thousands of

million rupees are lost annually in production. NDDB's efforts in this field are a matter of great pride. NDDB has developed a live tissue culture attenuated vaccine to control theileriosis, a blood protozoan infection that is usually lethal in European and crossbred cattle. This vaccine is the only one of its type commercially available in Asia.

Foot and Mouth Disease (FMD) is a major cause of reduced milk yields and diminished draught power in India. NDDB has pioneered the effort to identify the prevalent serotypes through analysis of Indian field isolates. In order to ensure that the vaccine would reach India's farmers, NDDB established a state of the art facility, Indian Immunologicals, which is the largest FMD vaccine plant in Asia.

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Mastitis is another endemic disease that undermines the health and productivity of our national milch herd. It is estimated that more than 40 per cent of our cattle and almost 25 per cent of our buffaloes suffer from subclinical mastitis. NDDB has developed a simple diagnostic aid for its detection at a stage when therapeutic and control measures can reduce losses from decreased production.

Haemonchus contortus, India's dominant worm species, is a major cause of parasitic gastroenteritis which leads to poor growth, delayed maturity, reduced milk production, lengthened inter-calving periods and the death of young animals. Conventional treatment requires forceful oral administration, placing difficult demands on both the farmer and the animal and the presence of a veterinarian. NDDB has developed medicated feed pellets that kill even drug-resistant worms without the need to restrain the animal. This should lead to far more widespread treatment of worms and lowered losses from parasitic gastroenteritis.

Milk production is, of course, only half of the story. The other half is the sale of milk and milk products that provides the highest returns to our dairy farmers. Here too, S&T have played an important role in development of products, processes, packaging, handling, transport and storage. Among the major breakthroughs have been:

- automation of *khoa* production, moving this process from the backyard to the modern dairy.
- design of the process technology and equipment for manufacture of *peda*, *gulab jamun*, *cchhana podo*, long-life *panneer* and other Indian milk products.
- development of continuous lines, including packaging, for fermented milk products like long-life *lassi*, *shrikhand*, *dahi* (yogurt) and *misti doi*.
- process technologies for production of Cheddar, Mozzarella and Emmental cheese as well as a variety of cheese spreads using both cow and

buffalo milk.

- preservation of starter cultures for fermented milk products.
- process of manufacture of dry mixes for *gulab jamun* and frozen deserts.
- user-friendly milk testing kits.

As satisfying as the achievements have been, the real challenges lie ahead. Among the most important are:

- Ensuring steady growth in productivity while ensuring that dairying remains concentrated in our landless, marginal and small farmer communities.
- Using advanced breeding technologies to accelerate the development of our high potential Indian cattle and buffalo breeds.
- Developing quality control methods that are sensitive to the fact that our milk comes from large numbers of small producers.
- Ensuring increasing reduction in losses from endemic and epidemic diseases at costs our farmers can afford.
- Expanding the variety, improving the quality and maintaining the relative price of India's dairy products so that they can meet competition from around the world.
- Ensuring that the growth of the dairy industry contributes to enrichment of our environment while continuing to benefit low-income producers without compromising our nation's need for milk.

These and other challenges face the current and next generation of scientists and technologists. Their predecessors have built a solid foundation. The strength of that foundation is due in large part to the fact that India's dairy farmers have set the research agenda. Beginning with Amul during the 1940s, it was their need that inspired the work of our dairy scientists and technologists. It is the evolving needs of India's several million dairy farmers that will inspire those who follow.