



Connecting the Milk Grid

Smallholder dairy in India

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Milk has historically been an important source of protein for Indians, especially for the country's many vegetarians. But India has not always been able to produce enough milk to satisfy consumer demand. In the 1950s and 1960s, India faced severe milk shortages and relied heavily on milk imports. Millions of Indian farmers, most with just a few cows, produced milk, but they had no way of delivering their highly perishable products to the fast-growing cities where demand for milk was high and rising.

Impressed by the success of a dairy cooperative union in Gujarat, the Government of India established the National Dairy Development Board (NDDB) and mandated it to expand the pattern of dairy cooperatives established in the Anand District of Gujarat throughout India. The NDDB conceived and developed the Operation Flood program, which organized dairy farmers into cooperatives, introduced technological advances to help them produce more milk, and transformed the policy environment in support of smallholder dairy. It helped create a national “milk grid,” linking India's dairy cooperatives with major cities in a chain of milk production, procurement, processing, and marketing. The beneficiaries have included small-scale dairy farmers, urban and rural consumers, and even landless milk producers. This intervention had a large impact on the evolution of the dairy industry in India and successfully contributed to improving nutrition and reducing poverty.

Today, in the wake of Operation Flood and other development programs targeting the dairy industry, milk production has nearly tripled. India

has become the world's largest producer of buffalo and goat milk and the sixth-largest producer of cow milk. Operation Flood contributed to a “white revolution” in India, similar to the Green Revolution in crop production (see Chapter 3).

Flooding India with Milk

India's dairy industry is largely traditional, local, and informal. Milk production is dominated by smallholder farmers, including landless agricultural workers, who rely primarily on family labor to collect and deliver milk to consumers and markets. Eighty percent of milk comes from farms of only two to five cows.¹ These many small farms traditionally lacked access to markets. No system existed for procuring milk produced in rural areas, and the perishable nature of milk made it difficult and expensive to transport.

In response to the limitations of this system, milk producers of the Anand district in the state of Gujarat organized themselves into a private cooperative called Kaira District Cooperative Milk Producers' Union Ltd. in 1946. After a visit to the cooperative, Prime Minister Lal Bahadur Shastri decided that this model should be replicated throughout India. His dream came to fruition in a bold initiative to “flood India with milk” through a sophisticated procurement system using rural production to satisfy urban demand. Operation Flood, a national-scale, federally sponsored intervention, began in 1970 and lasted until 1996.

Operation Flood was designed to increase milk production, ensure that a stable supply reached rural and urban consumers, and raise the incomes

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Smallholder dairy producers test and measure milk, India

of dairy farmers. It replaced the ad hoc production, marketing, and selling of milk with an organized, continuous dairy-supply chain from production to consumption. The intervention was organized in three tiers. At the base, farmer-controlled, village-level cooperatives were responsible for supplying milk to the production and marketing chain, making local dairy sales, and testing samples of dairy products. The middle tier was made up of district-level cooperative unions, which owned and operated processing plants, transported equipment for collecting and processing milk, and managed cattle feed plants. They also provided animal healthcare through livestock centers. At the apex were state federations, which conducted marketing and coordinated interstate sales. This network of village dairy cooperatives, district and regional cooperative unions, and state marketing federations became known as the national milk grid.

The various elements of the dairy industry—production, procurement, processing, and marketing—were, however, carefully scaled up in three phases. Phase one, carried out from 1970 to 1980, targeted just four major urban markets—Mumbai, Kolkata, Delhi, and Chennai (known as Bombay, Calcutta, Delhi, and Madras, respectively, at the time of Operation Flood)—for milk marketing and incorporated 1 million rural milk producers with 1.8 million milk-producing animals. The second phase, from 1981 to 1985, expanded the program to 10 million rural producers with several million head of improved high-quality, crossbred dairy cows. During this phase, the number of milk sheds rose from 18 to 27, and marketing expanded

to cover all 147 major Indian cities. The third phase, lasting through the mid-1990s, focused on consolidating and filling remaining gaps in the grid. It targeted nearly 7 million farm families and 170 milk sheds, and improved veterinary health-care (see Figure 17.1).

The government of India created the National Dairy Development Board in 1965 and made it responsible for appraising, promoting, and supporting dairy cooperatives. The NDDB was established to direct India's dairy development, by planning and providing farmer extension services, and improving dairy technologies, veterinary services, and nutrition. The founding chair of the NDDB, Dr. Verghese Kurien, the AMUL general manager, transformed cooperatives from an idea into a reality and conceived the overall design for Operation Flood. The Indian Dairy Corporation, established to manage the financial aspects of the intervention, later merged into the NDDB, which continues to oversee dairy development programs throughout India today after the completion of the Operation Flood program.

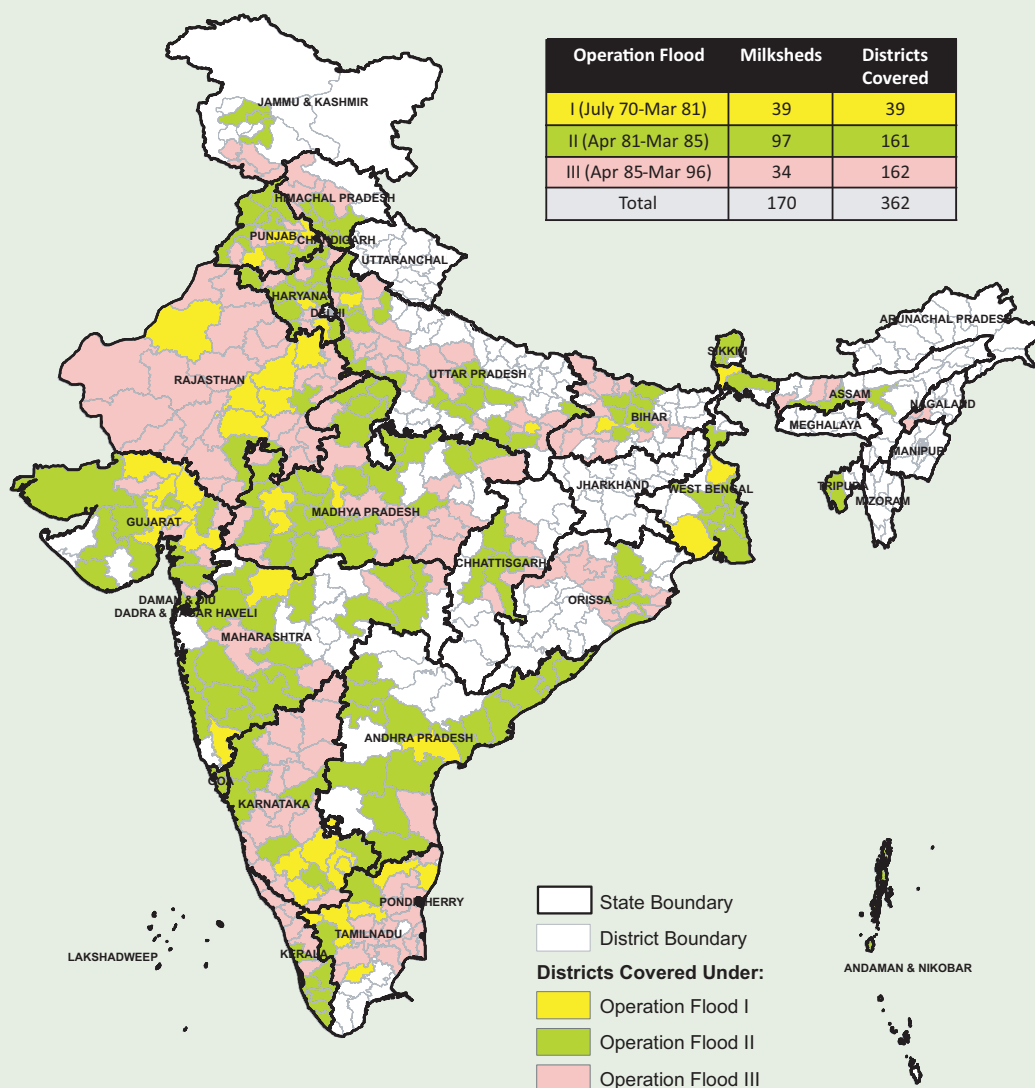
Financing for Operation Flood came from an innovative source. When the European Economic Community (EEC) donated surplus dairy commodities—skimmed milk powder and butter oil—to India, the architects of Operation Flood incorporated these EEC donations with milk produced by Indian cooperatives and sold the combined products to help pay for development of the dairy industry. In this way, food aid was monetized to support local production. The intervention also drew on loans from the World Bank.

How Operation Flood Reshaped the Dairy Industry

Operation Flood linked rural dairy producers to urban consumers through dairy cooperatives, trucking networks, chilling plants, refrigerated vans, railway wagons, and processing plants. By linking production to consumption, the program created the incentives needed to encourage dairy producers and others involved in the supply chain to invest in order to increase their earnings from dairying. Gradually their confidence in dairying as a stable source of employment and income rose.

Operation Flood aided this process by introducing numerous technological and infrastructural

Figure 17.1—Operation Flood's geographic coverage, 1970–96



Source: National Dairy Development Board. 2009. Personal Communication.

advances in dairying. On the production side, advances included crossing exotic breeds of cows with indigenous breeds to improve production. Estimates show that whereas one indigenous cow provided about 1.5 kilograms of milk a day, a crossbred cow could provide 4 kilograms a day.² On the processing side, advances included the introduction of silos, pasteurizers, storage tanks, and refrigerators that conformed to international standards, increasing the nation's capacity to convert milk, a highly perishable commodity, into a

commodity that could be stored and traded nationwide. And on the marketing side, new technologies were developed to improve the weighing and testing of milk and to improve the capacity to sell it in bulk.

Some critics argued that crossbreeding favored larger farmers, eliminated indigenous Indian animals, and increased reliance on higher-quality feed. In fact, crossbreeding was part of the Indian government's strategy for improving productivity in India without wiping out well-known breeds of Indian cattle. Only a small percentage of Operation



Refrigerated milk goes to market, India

Flood's strategy focused on crossbred animals; and even landless milk producers sometimes acquired these animals.

Between the periods of 1988–89 and 1995–96, milk production increased from 42 million liters a day to 67 million liters a day, milk procurement increased from 28 million liters a day to 35 million liters a day.³

A study of three districts—Bikaner in Rajasthan, Periyar in Tamil Nadu, and Sabarkantha in Gujarat—illustrates the benefits of Operation Flood at a community level.⁴ The study showed that households in villages with cooperatives had higher average incomes from all income sources, higher average incomes from milk, and higher average levels of employment. The creation of a national milk grid and the establishment of village cooperatives and district unions throughout India generated many jobs; as of the early 21st century, 11 million households were employed by dairy cooperatives.⁵ The households benefited from cooperatives they owned, as well as from cooperatives that sold them feed, provided veterinary care, and purchased their milk.

Although India's dairy sector may have grown regardless of Operation Flood and cooperatives set up under Operation Flood accounted for only a small share of the total milk procured and marketed in India, these cooperatives were responsible for a major share of the formal, organized dairy sector. With the help of some other development factors, Operation Flood successfully created an enabling environment for dairy-sector development in India.

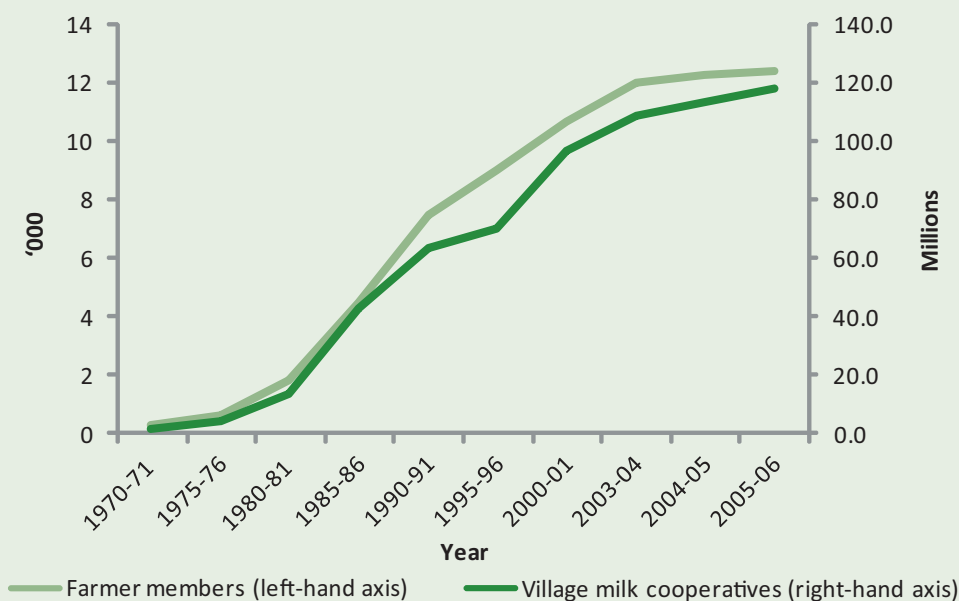
A Lasting Impact

More than a decade after the conclusion of Operation Flood, the dairy cooperative network continues to grow (Figure 17.2), and production and marketing continue to increase. The number of individual cooperative participants remains high (at 13 million in 2008, including 3.7 million women), and cooperatives still produce high volumes of milk. And although these numbers represent only a small proportion of India's dairy market from any angle, they still convey the scale of Operation Flood's success in revolutionizing the dairy industry in India.

Consumers now have increased access to more and better-quality milk products. Since the 1970s total output of milk and milk products has continuously risen faster than crop production. Dairy production rose an average of about 4.5 percent a year between 1970 and 2001. Official government statistics for 2007–08 show that India is producing more than 100 million tons of dairy a year and that per capita availability of milk is near 250 grams a day, up from 128 grams a day in 1980 and 113 grams a day in 1968, before Operation Flood began (Figure 17.3).⁴ Among dairy farmers, overall per capita consumption of milk increased from 290 to 339 grams per day between 1988–89 and 1995–96.

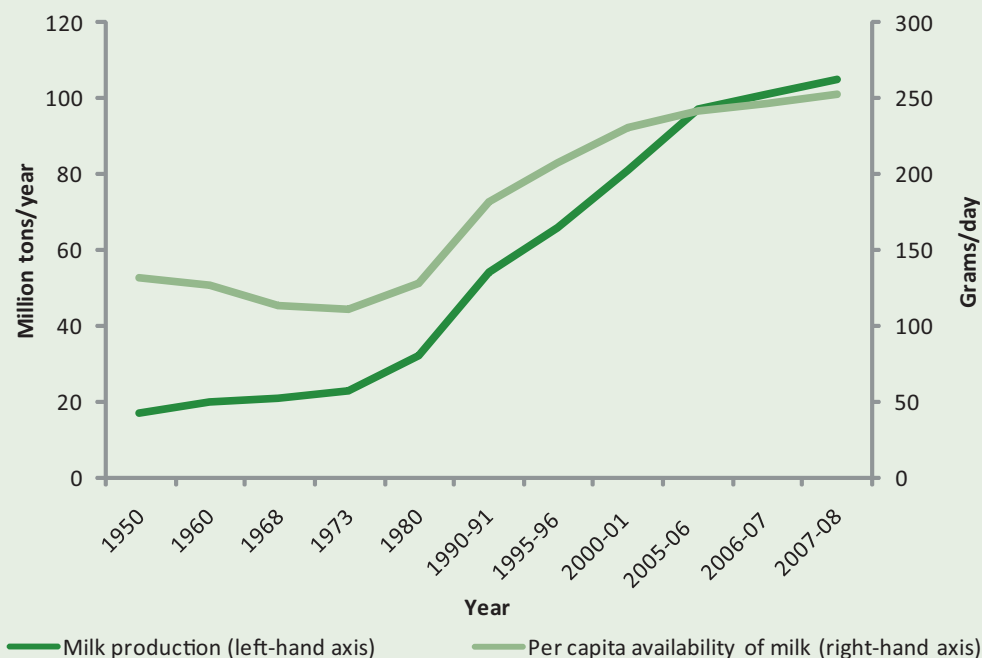
Operation Flood also had a favorable impact on income distribution in India. Although it was not a primary aim of the program to improve income distribution in India, by reaching out to small, marginal farmers and landless milk producers, it stands to reason that by promoting access for all to a strong milk market, balanced cattle feed, animal healthcare, and artificial insemination services the intervention would have a positive impact on income distribution between the rich and the poor. Studies of Operation Flood showed that the program effectively engaged the rural poor: in 1984, 72 percent of cooperative members were small and marginal farmers (or those who operated fewer than 5 hectares of land) and the majority of these were also from minority castes and tribes.⁵ Landless farmers' incomes doubled after the organization of milk collection through cooperatives.⁶ Later studies showed that among landless households, milk production made a considerable contribution to income generation and confirmed the potential for poor households to increase their income through milk production.⁷

Figure 17.2—Cooperative growth during and after Operation Flood, 1970–2006



Sources: Gupta, P. R. 1997. Operation Flood: The third phase. In *Dairy India 1997*, ed. P. R. Gupta. New Delhi: P. R. Gupta; NDDB (National Dairy Development Board). 2006. *Annual report, 2005–2006*. Anand, India; Aneja, R. P. 1994. *Dairying in India: A success story*. APAARI Publication 1994(4). Bangkok, Thailand: Asia-Pacific Association of Agricultural Research Institutions.

Figure 17.3—Production and per capita availability of milk in India, 1950–2008



Source: National Dairy Development Board. 2009. National Statistics. < www.nddb.org/statistics/milkproduction.html>; Gupta, P. R. 1997. *Dairy India 1997*. New Delhi: P. R. Gupta; Nair, K. N. 1995. White revolution in India: Facts and issues. *Economic and Political Weekly* 20 (June 22–29): A89–A95.



Providing balanced feed to cattle, India

Operation Flood also benefited women. Employment rates, including those of female workers, were higher among Operation Flood beneficiaries than among nonbeneficiaries.⁸ Extension activities, such as education on cattle breeding, meetings for knowledge sharing, and tours of dairy plants—all essential components of the cooperative development process—have worked to engage women directly, with visible impact on women's knowledge, confidence, and societal status. Not only are women increasingly depositing milk in cooperatives, but they are enjoying the benefits of higher prices, better information, and improved access to healthcare for their livestock. Women now make up more than 25 percent of cooperative members, and more than 2,700 all-women cooperatives are functioning. Women continue to play a small role in running the dairy cooperative societies; however, less than 3 percent of board members are women.⁹

Drawing Lessons from the Operation Flood Model

Imitations of Operation Flood have already begun to emerge. In India alone, the Operation Flood model is being replicated for other products,

including vegetable oils, fruits, and vegetables. Other Asian countries, such as China, the Philippines, and Sri Lanka, are also following this model. It is thus worth examining Operation Flood to learn from its design and implementation, as well as the myriad ways in which it generated impact on rural welfare.

Use food aid for development

Food aid has traditionally been used mainly for humanitarian purposes. Operation Flood marked the first time that food aid was leveraged as a resource for investment in development. Operation Flood used dairy products supplied as food aid by the European Economic Community as raw inputs to stimulate the growth of the dairy supply chain and used the proceeds from those commodities to help finance dairy development. This strategy helped scale up the industry, thus creating the capacity to absorb increasing production from India's own dairy production.

A related and more subtle message concerns the importance of a longer-term perspective. Several leaders had the foresight to see what could happen if new avenues for dairy development were not pursued: mass quantities of cheap

From Impounding to Empowering: Smallholder Dairy in Kenya

Kenya is the “milkshed” of Africa, with more than 6 million dairy cattle producing roughly 4 billion liters of milk per year, and higher milk consumption (145 liters per person per year) than any other African country. Most dairy cattle are owned by small-scale farmers, and an estimated 86 percent of their milk is supplied in an unprocessed form to consumers through a supply chain dominated by small-scale traders, transporters, and sellers.^a

Until recently, public policies and business interests controlled the country's dairy supply chain to such an extent that small-scale milk vending of lower-priced raw milk in urban areas was essentially criminalized in the name of food safety and quality. With the support of the Kenya Dairy Board, the government's regulatory agency that oversees the dairy industry, these policies and interests created a market based on unfair competition. The negative repercussions affected both small-scale milk vendors, many of whom are women, and consumers, many of whom prefer to purchase milk from outside the formal industry because of lower prices and preferred taste.^b

The conflict between the few large businesses on the one hand and the poor, haphazardly organized, and voiceless small-scale milk traders on the other became more apparent in the mid-1990s following the collapse of the dairy market monopoly—the Kenya Cooperative Creameries, a parastatal company—due to poor management, corruption, and weak competitiveness.^c With the monopoly's collapse, the door was opened for other private-sector dairy processors to enter the market, bringing about a newly vibrant industry for smallholders.

But it quickly became apparent that these new processors were unable to fill the gap left by the monopoly, while the status quo that criminalized raw milk sales in urban areas continued. To address this policy challenge, key stakeholders in the dairy sector redirected the efforts of the collaborative Smallholder Dairy Project, which ran from 1997 to 2005 and brought together the Kenya Agricultural Research Institute and the International Livestock Research Institute with the Ministry of Livestock and various civil society organizations.^d The project helped set in motion a policy-change process at multiple levels with diverse decisionmakers in both government and industry. The project also developed a pragmatic model for training, supporting, and certifying small-scale traders as a means of assuring milk quality, strengthening their business capabilities, and expanding the market.

In 2004, the project contributed to the introduction and enforcement of new regulations that streamlined license application processes in the dairy trade. This allowed small-scale milk producers, traders, tea shop retailers, and transporters to legally engage in dairy activities and take part in the newly instituted milk quality assurance scheme.

Today, there is evidence that this new legislation, combined with continued growth in Kenya's dairy market and the reorganization of industry players such as the Kenya Dairy Board, has contributed to welfare improvements. Smallholders are able to sell more milk to consumers at a lower cost, consumers are enjoying safe, lower-priced milk, and new jobs are being created throughout the dairy-supply chain. One study suggests that large economic benefits are attributable to the policy change.^e These benefits have also stimulated wider interest among policymakers in other countries in the East African region, with some already embarking on implementing similar schemes.

Prepared by: Amos Omore and Steve Staal

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- c. Owango, M. O., J. S. Staal, M. Kenyanjui, B. Lukuyu, D. Njubi, and W. Thorpe. 1998. Dairy co-operatives and policy reform in Kenya: Effects of livestock service and milk market liberalisation. *Food Policy* 23: 173–185.
- d. Kenya Smallholder Dairy Project. 2009. The smallholder dairy project. <www.smallholderdairy.org/objectives.htm>. Nairobi.
- e. Kaitibie et al. 2009.

dairy imports could have poured into India and destroyed local markets.

Invest in local markets

Operation Flood focused not only on boosting milk production, but also on developing a strong marketing system for milk. The architects of Operation Flood continuously analyzed the rising demand for livestock products and designed an integrated and comprehensive program to meet this demand, complete with supply-chain management systems and centralized quality control.

Support collective action

Operation Flood demonstrated how collective action can be an effective tool in promoting commercialization among farmers. By bringing dairy producers together in cooperatives, the program provided markets with quantities of milk that would have been too costly to assemble from producers on an individual basis. The cooperatives also played a role in strengthening social cohesion, overcoming rural caste and class hierarchies, and fostering a sense of ownership in the development process.

Envision creative structures

Operation Flood revolutionized how dairy was conceived and organized. Concentrating on a single

primary product, it created a vertically integrated value chain encompassing every aspect from primary producer to final consumer. Horizontal integration—bringing inputs, extension, and services all within the same program—also helped ensure that the benefits of economies of scale were available to each producer. The cooperative infrastructure made it easy for producers to use new products and processes.

Conclusion

Operation Flood was a key element in the transformation of India into a self-sufficient milk producer, and even into a milk exporter. By pointing the way to the use of production-enhancing technologies, establishing more effective and efficient supply chains, and orienting producers toward markets, Operation Flood helped promote a more productive Indian dairy industry. Milk is now big business in India. As of 2007 India was the largest milk producer in the world, and milk was a bigger contributor to the country's gross domestic product than rice. At least 20 percent of India's agricultural economy is composed of dairying, and about 70 percent of the rural population is somehow involved in milk production. The growth in production has made milk increasingly available to consumers, providing an important source of nutrition for millions of people. ■

NOTES

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