

Dr. M.R. Srinivasan Memorial Oration **Innovation and Entrepreneurship in Milk Processing and Marketing**



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Milk: A Commodity of National Importance

Milk, having been recognized as an important commodity, drew the attention of the rulers all over the world, to ensure its hygiene, safety and preservation so that it significantly contributed to the growth and wellbeing of the society.

While the early economists recognized the importance of milk and butter in the wealth of nations, early scientific discoveries led to ensuring safety in public health by making it compulsory to pasteurize it. That was nearly a

hundred years ago in the West as milk became the carrier of dreaded diseases like tuberculosis.

We, in India, were fortunate to have boiled our milk my favorite saying is that if we had not boiled our milk, we would not have had a population explosion.

Milk fat has always been considered the most expensive component of milk. Butter and milk find a mention in the Wealth of Nations by Adam Smith as significant contributors to the small farmers' economy.

Early dairy technologists pioneered research in the application of the principles of gravity to extract milk fat more efficiently. That led to the ultimate invention of the first centrifugal cream separator by De Laval ushering in a major revolution in milk processing.

This technology with its early adoption led to the application of centrifugal separation in all kinds of industrial applications in recycling water, sewage treatment and even the harnessing of nuclear energy.

Modern Milk Driers have been using cyclones to ensure that fine milk powder particles are fully recovered, today such cyclones are being used in high-end vacuum cleaners and recovering dust particles in coal-powered electricity generation plants.

Drawing inspiration from the rudimentary, continuous sausage-filling packaging of milk in Tetra Pak led to technological innovation that produced the richest business entrepreneur in the World. I need to remind that before Bill Gates, the Rausing of Tetra Pak fame was the richest family in the world, all because of the technological innovations that they made. And before India ushered in the digital revolution, it was best known for its white revolution.

Milk: The Most Perfect Food

We have to recognize that the development of the milk industry is the recognition of the fact that a very large population of the world, rightly believes it is the closest to a perfect food, we have to recognize that apart from the genuine allergies to milk, lactose intolerance is highly exaggerated by the vested interests that market milk substitutes. They are merely cashing in on the human weakness to listen to all kinds of misinformation that can now be easily transmitted on the net. Even the so-called lactose intolerant people in Japan and China have switched over to large-scale milk consumption as they have seen the health benefits of milk to produce stronger and taller human beings, they overcame the lactose intolerance by introducing yogurt that helps in the assimilation of lactose in human body, Lo and behold China is the fastest growing milk producer apart from India.



Technology and Entrepreneurship: White Revolution

Milk production in India is highly seasonal. It is largely based on the use of crop residues and agricultural by-products whose availability depends on monsoon rains. We have winter production of milk almost thrice the production in summer months. With the demand being constant, the winter glut of milk led to a drastic drop in farmer prices. The drying of milk was the single most technological adaptation that helped in stabilizing farmer prices and the rest was done by the farmers who made India the largest producer of milk. The organizational efforts to make it a producer-driven economy did the rest.

India was advised not to produce milk as it was akin to asking people to eat cakes when our poor farmers did not have two meals a day. We were told that buffalo milk cannot be converted to milk powder because of its high lactose content. Some of this advice came from what Dr. Kurien called "postage stamp" size countries like New Zealand which were large global players in the milk powder market.

So let us see where these countries stand in the world of milk production (**See Table 1**).

China today is one of the largest importers of milk products and the fastest-growing dairy sector. So much for lactose intolerance by the Far East populations. The Chinese followed the Japanese who had grown four inches taller as they switched over to milk after the Second World War. I like to think that we Indians are growing the same way ever since milk availability has increased in the country.

Unique features of the Indian milk production and marketing systems

- India's milk production is characterized by integrating the use of crop residues and agricultural by-products into the small farmer farming system. Milk production in India optimizes on its land, water, and family

resources. It is now known to be a very competitive milk production system as compared to the capital-intensive dairy farming in the West. It may appear to be inefficient when you look at lower milk yield per cow. The milk production system is constantly improving the conversion efficiency from feed to food. And it certainly seems to be pretty efficient from cash input to output ratios.

- India also has many sources of milk animals. The dominance of Buffalo milk in the Indian milk marketing system is slowly giving way to cow milk. The unique feature of India's dairy system includes milk from other species like goat milk and even camel milk. Goat milk production in India is almost 6 million tonnes. Goat milk production in India today is about 30% of India's milk production of 20 million tons in 1970. Goats in India are considered poor man's cows. Goat milk and cheese are now being preferred by a section of the global population.
- Another feature of India's milk production is its pronounced seasonality. Much of India's milk is produced during the winter months when plenty of natural herbage and crop residues are available. The production goes down dramatically during the summer season because of a lack of feed resources. Our peak production happens to be during the lean period in the west.
- India's milk is not subsidized it has no quota system and it has no restrictions to regulate supply, as is done in the West. In the West, the value of the milk quota can sometimes be even more than the value of the cows and physical assets at a dairy farm. This distorts the market which has led to the WTO interfering in the global dairy trade.
- Seasonality in milk production was a huge curse as it would lead to lowering milk prices for the farmers and take away any incentive to produce more milk. With modern technology, India now conserves the seasonal surpluses as daily commodities and uses

Table 1: Global Milk Production (1971-2021)

Country	1971 Million Tons	2021 Million Tons	Annual Increase %
India	20	210	19.0
US	53	102	1.96
Pakistan	8	66	14.5
China	2	41	39.0
Australia and NZ	14	22	1.14
Europe	112	155	0.7
Global	391	918	2.7

these commodities to meet the shortages during the summer months. This has stabilized milk prices for the farmers as a result, the Indian farmers have made India the largest producer of milk in the world.

- Lower milk plant utilization during the summer now provides an opportunity to use the milk conservation facilities to process other seasonal fruits and vegetables that need to be marketed more efficiently.
- One of the key factors in India's milk consumption is the high value attached by its consumers to the nutritional properties of milk. As incomes rise in India, consumers try to reach out for more milk and milk products. The income elasticity for expenditure on milk and milk products is greater than one. What it means is, that every increase in income leads to a matching increase in the demand for milk and milk products. That accounts for the absorption of 10 times more milk in the Indian market over the last 50 years. Will it continue to do so despite the growing talk about lactose intolerance, the vegan movement and the frequent reports about adulteration of milk and challenges from milk analogues?

Indian Milk Production: Limits to Growth

Some 50 years ago, we were told that there would not be enough feed and fodder to meet the objectives of increasing milk production. Somebody got a Ph.D. on this hypothesis. Twenty years ago, we were told that we would not have enough water to produce milk. I am not referring to extending supplies of milk by the addition of water as the traditional *Doodhwala* did. The lack of availability of water leads to a reduced supply of feed and fodder. Ever since this issue was raised our milk production has grown by 50% and Rajasthan, the desert

Table 2: State-wise Milk Production (in MT) in India

State	2021	2001
Rajasthan	33.3	7.7
UP	33.1	14.6
MP	19	5.3
Gujarat	17	5.9
AP & Telangana	15	5.8
Maharashtra	14	6.1
Punjab	14	7.9
Bihar	12.1	2.7
Karnataka	11.8	4.8
Haryana	11.6	5.0
Tamil Nadu	10.1	5.0

state in India has become the largest milk producing state in India (**See Table 2**).

Milk is a large component of the consumer spending on foods. It also happens to be the cheapest of all protective foods even in terms of calories per rupee and as long as milk stays competitive, its position in the food basket will remain secure.

But there must be some limits to this growth. That will be another topic for the planners to discuss. In the meantime, the share of the organized milk sector has grown from less than 1% in the seventies to nearly 40% and there is ample scope for increasing this share.

We have still not fully explored, the dairy sector integrating with other foods particularly liquid foods that it can easily handle. We have not even explored the huge potential that traditional milk-based sweets offer. They are very profitable and industrial production will save on fuel consumption and heat recoveries, at the end of the presentation, I will show a short film clip on how a young player in the market is cashing on this opportunity.

Future Directions

The dairy industry must explore maximizing turnover and expanding beyond market milk, dairy commodities and markets that are underserved. It also must meet the challenges of being environment friendly.

Some 50 years ago Dr. Kurien initiated serious discussions on the technology that we use for milk collection, transport, processing and distribution of market milk. We studied it from cost, convenience and energy used by the then systems depending on bottling milk. The results were published by the Indian Dairy Association. To the best of my knowledge, no such exercise has been carried out. Now is the best time to set up a core group like the IDF had on Technology and Engineering to keep on exploring newer ways of making the sector more efficient.

Securing the reputation that milk enjoys in the Indian market has to be the top priority for the dairy industry. Any tarnishing of this image will have serious consequences on the long-term growth of the sector. Mislabeling by the organized sector also needs to be watched. The industry must come together to ensure this. A case in point is the regulatory authorities objecting to 6% fat milk as whole milk and at the same time allowing condensed toned milk to be termed as condensed milk.

Some Californian large-scale dairy farms where cows don't even have enough standing space in dung-free conditions have brought forth the issue of ill-treating cows. That has repulsed the consumers to the extent that some



have given up on milk. We have to guard against these issues related to animal cruelty. Some of these issues have been grossly exaggerated and exploited by the vegan groups.

The use of Plastics in milk packaging is an issue that deserves global attention. One of the alternatives is to have suitable biodegradable packaging materials that need to be promoted. This also needs support from the Governments all over the World.

I have to once again bring to your attention the opportunities that lie in improving the quality of our raw

milk. This can be done by providing higher prices as an incentive to produce cleaner milk and charging the consumer for the best-grade milk.

In conclusion, innovation and technology will continue to take the Indian Dairy Industry forward to its goal of becoming the Dairy to the World. Indian milk production will continue to lead its agriculture particularly benefiting the small farmers as it continues to pay the milk producers the maximum share of the consumer's rupee and keep the milk and milk product prices at reasonable level to promote greater consumption by its consumers.



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