

Review Article

CHALLENGES AND OPPORTUNITIES OF DAIRY SECTOR IN INDIA VIS-À-VIS WORLD: A CRITICAL REVIEW

Avijit Sarkar¹, Avijan Dutta²

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ABSTRACT: Globally, dairy sector is undergoing phenomenal changes in terms of technology, feed quality, health & quality of breed, quality assurance, equipment & machineries, diversification of milk products and marketing concept. This is forcing the dairy sector to relook at the current strategy. With consideration of existing challenges and opportunities at milk producers, milk processors, marketers and consumers level, this review article has outlined overarching viewpoints and subsequently, has explored how the dairy sector needs to adapt. Study has been extended from global to National level including the state of West Bengal. Indian Dairy sector needs to take care of a few basic problems like shortage of quality feed & fodder, quality bovine breed and below par milk producers' selling price. In addition, a few relevant opportunities should be availed through co-product generation as a part of holistic approach in handling dairy farming and dairy industry. In view of significant socio-economic dependency in Indian context, revenue model needs routine exploitation from biogas generation, culling of unproductive animals, adoption of economies of scale at milk federation level and effective institutionalization in states like West Bengal to establish this dairy sector as a sustainable source of livelihood.

Key words: Dairy development, Socio-Economic factors, Value drivers, Marketing mix, Sustainability.

INTRODUCTION

Dairy sector is undergoing a number of changes and challenges all over the world (Knips 2005). Factors such as access to technological innovations, improvement in infrastructural facilities and creation of modern era marketing insights have been quite significant to give a strong boost to dairy development. The changing trend of global dairy industry is noteworthy. This sector imparts a major socio-economic benefit for rural India. This benefit can be enhanced further while capturing the large unorganized market base of Indian dairy sector. Accordingly, the interest is to explore sustainable model of dairy farming especially with respect to small, marginal and landless farmers and opportunity in market expansion for dairy industry. Study would include sector specific constraints, opportunities, advantage and disadvantage with respect to trade policy, growing demand and future prospect of both developed and developing countries.

CHALLENGES AND OPPORTUNITIES OF DAIRY SECTOR: GLOBAL PERSPECTIVE

The major stakeholders of dairy industry are milk producers, milk processors, marketers, retailers and

consumers. Milk producers, value chain and consumers are equally essential in development of dairy sector. Major countries in this sector are found to pay attention as per their priority. Countries like Denmark, the Netherlands, Australia, China and many other are found to have 'Milk Producers based focus' in their priority. However, Israel, India, Brazil and many other countries have taken a cue towards 'Value Chain based' dairy development activity. On the other hand, Italy, Sweden and a few such countries have taken up 'Customer based focus'. However, Germany is probably the only country which has considered all the factors i.e. milk producers, value chain and customers in their consideration for development of dairy sector (Hemme and Reyes 2017).

Milk Producers

In view of present day requirement, milk producers need to adopt evolving technology and improved farm management practices. This technology and management practices improve farm productivity (Khanal *et al.* 2010). In this regard, 'datafication' enables farmers to avail quantifiable information which helps to measure, monitor operations and act accordingly (Anonymous 2017a).

¹Department of Dairy Business Management, Faculty of Dairy Technology, West Bengal University of Animal and Fishery Sciences, Kolkata 700 037, India. ²Professor, Department of Management Studies, NIT, Durgapur 713 209, India.

*Corresponding author, e-mail: sarkaravijit@rediffmail.com

However, producers are subsidized in many developed countries like USA, Mexico etc. which leads to encouragement of mass production (Knips 2005). Export subsidies are given in these countries apart from creating tariff and non-tariff barrier. As a result, producers of developing countries face stiff challenge to match the local price against the cheap import price (from developed countries). The realities are being faced by poor small scale farmers of underdeveloped countries like Kenya, Dominican Republic, Jamaica and so on (Knips 2005). Export subsidies helped European Union exporters to enter and grab market in developing countries while offering lower pricing. The World Trade Organisation's decision to end export subsidies is good news for farmers and consumers of underdeveloped & developing countries (Anonymous 2017b).

In addition, cost minimization, capital investment minimization (per production unit) and increasing milk production are some of the common techniques which help small as well as medium herds for doing better business performance. Simultaneously, productivity and management skill help to create business sustainability (Dhuyvetter 2011).

Milk Processors

There is increasing consumer demand for protein rich, healthy and 'clean label' milk products. Present day consumers are in search of 'functional foods' (Anonymous 2017a). Demand for milk protein through formulated dairy based products is on increasing trend especially for sports personnel, senior citizens, babies and toddlers (Anonymous 2017c). Local marketers need to identify and utilize consumer insights to generate increased value for consumers. There is simultaneous requirement to establish safe supply chain similar to block chain along with well-maintained supply chain documentation. This can be kept available to customers through tamper proof ledger.

Milk and Milk Product Retailers

The changing consumer trends such as healthy snacks, protein rich food and frequent food consumption outside the home and increasing online shopping are quite common in present day food habits. Dairy products are in good demand as these products are cheap source of protein, palatable in taste and available at ease. In fact, retailers need to target customers with tailored offers with required inputs from databank. Retailers also have to match supply and demand even in smaller stores through just-in-time inventory management.

Adaptation to Challenges and Opportunities

Dairy market faces a volatile market like other agriculture commodities (Weber *et al.* 2012). This necessitates the balancing in supply and market demand. While looking towards this balancing, there is a need of consideration for both domestic and global markets. Storing milk in form of higher shelf life products can be a supportive option. It is accepted that milk production does not relate with consumption trend. Hence, there is need of pro-active planning in balancing inventories through traders.

The changing patterns of consumer demand have influenced food production and consumption at various stages of value chain (Olutosin 2018). It has lead to a number of new value drivers for consumers in course of making food choices. Evolving drivers of health and wellness, safe food product, social impact and experience have surpassed the 'Traditional' value drivers like price, taste and convenience (Anonymous 2017a). In fact, purchase decisions are getting increasingly based on 'product plus' factors such as specific ingredients, processing method of the product and corporate values of the manufacturer and retailer, marketing techniques and so on. Now, consumers have access to social media and communication linkage where they can express their opinion. In view of today's competitive market, corporate should have the mechanism to provide consumers with relevant information in an open, unbiased and transparent manner. This is again a challenging task. In this regard, importance of 4-Ps (i.e. Product, Price, Place and Promotion) as marketing tool can be successfully adopted. A Vietnamese milk corporation, Vinamilk, gained significant market share through proper application of marketing mix of 4Ps in Vietnamese dairy market (Dang 2014). Branding has been used as an effective marketing tool in developed countries. Chimboza and Mutandwa (2007) assessed the level of brand awareness along with relevant factors responsible towards brand preference of dairy products, both in Chitungwiza and Harare urban markets in Zimbabwe. Customer based brand equity and its' strengthening through marketing communication are quite significant in present day organization (Keller 2009). However, all four key determinants, namely, product quality along with attractive packaging, price, availability of product and promotion have been considered as responsive marketing strategies (Chimboza and Mutandwa 2007).

A series of key factors namely, i) Population growth, ii) Urbanization, iii) Income growth, iv) Increasing middle class income, v) Longer life span etc. have led the increasing demand for dairy products, especially in

developing countries (Daryanto and Ibu 2014). However, faster growth in consumption of dairy products is observed in developing countries mainly due to increasing population awareness and education.

Apart from supply and demand related factor, milk price is largely dependent on cost of milk production (Ghule *et al.* 2012). Both direct and total costs of milk production have been estimated as a function of distance. Although milk prices and costs are found higher with increased distance of production areas, but the increment remains lesser than transportation costs (Babb 1981). Distance between place of production and marketing has a significant role in livestock farming.

Cost of nutrient management system is a major part in computing cost of milk production. Margin over feed cost is a significant indicator for dairy farmers' financial health of the herd. The nutrient management cost gets escalated with incorporation of environmental regulations to the dairy farm. Environmental factors are also pertinent in livestock farming (Gertenbach).

Cost of production and involvement of supply channels including retailers are important factors in dairy business like other business sectors (Doyon *et al.* 2008). Technical and socio-economic factors influence the cost of the milk production and the profitability of the enterprise (Gunaratne *et al.* 2015). Impact from the socio-economic factors on the profitability of small capacity dairy farmers has been observed in Zambia. Profitability of dairy business depends on many factors like milk pricing system, farm location, farm size, etc. (Rhone *et al.* 2008). Increase in level of education, dairy cow herd size and reduction in market distance can lead to better profitability of small dairy enterprises (Mumba *et al.* 2012).

High feed cost, inadequate availability of pastureland and water can affect the growth of milk production (Ngongoni *et al.* 2006). Availability of arable land is a limiting factor for growth in milk production. All these factors emphasize the need of a policy for efficient use of the land to improve the milk production-to-land ratio (D'Haese *et al.* 2009). With the progress of civilization, availability of land and water for livestock agriculture is getting reduced. FAO has noted a challenge to avoid further environmental damage while maintaining growth of livestock production (Zering *et al.* 2012).

Management practices under tropical and temperate climate always have been a challenge to dairy farming. These management practices consider a few core areas, namely, i) fodder and feed production, ii) feeding management, iii) herd management, iv) housing system,

v) milking management and vi) general farm management (John 2009).

Dairy sector can contribute significantly to a country's GDP. Dairy Industry of Kenya contributes more than 15 % of the agricultural GDP and 3.5 % of total GDP (Muriithi 2014). A National Policy would be helpful in this aspect. Formulation of national policy would require inputs on the regional problems and respective solutions too (Block 2009).

CHALLENGES AND OPPORTUNITIES OF DAIRY SECTOR: NATIONAL PERSPECTIVE

India, the largest milk producer (Milk production: 187.7 Million Tons in 2018-19, Basic Animal Husbandry Statistics 2019, Government of India) of the world, has a unique way of milk production, its processing, sales and marketing, and consumption of milk. However, average milk yield and average farm size scenario are different in Indian dairy farming in comparison to developed countries like USA or Poland. Average milk yield (kg/cow/year) in India, USA and Poland is 1248, 9633 and 5504 respectively and average farm size (cows/farm) in India, USA and Poland is 2, 182 and 8 respectively (Hemme *et al.* 2015). Apart from the absence of quality breed and business scale, tropical and temperate climate have posed additional challenges to Indian dairy farming. The situations get more pronounced in dry region of Western India (Kant *et al.* 2015). A few major challenges faced by Indian Dairy sector are as follows:

Infrastructure: Adequate numbers of chilling centers are not available at village level. Efficient cold chain distribution network is also absent (Meena *et al.* 2017). Besides, there is need of proper infrastructure and manufacturing facilities for value added Products.

Feed and fodder: Shortage of supply of feed and fodder occurs mainly due to reduction in grazing land. In addition, a significant requirement of feed and fodder gets added due to unproductive animals. Small, marginal farmers and landless laborers engaged in dairy farming cannot afford to buy expensive feed and fodder. Further, non-supplementation of mineral mixture causes mineral deficiency diseases and metabolic disorders. Higher feeding cost decreases the profit of the dairy industry (Moran 2005).

Breeding system: Experts have identified two issues with Indian cattle breeds: a) most of the breeds require prolonged period to attain maturity and b) they usually have increased calving interval. These factors affect efficiency of animal performance (Singh *et al.* 2015).

Education and Training: Education and training on Good Manufacturing Practices is an essential requirement

for the farm employees (Poonia *et al.* 2014).

Animal Health: Adequate Veterinary health care, proper vaccination and regular deworming need to be ensured for sustainable production.

Hygiene Conditions: Unhygienic farming practice leads to disease of cattle and buffalo. This also leads to compromise in the quality of milk resulting in spoilage of both milk and milk products.

Farmers' Milk Selling Price: It is often noted that milk producers do not get the legitimate price of milk due to presence of middleman and vendors in the supply chain. In this regard, Milk Co-operatives need to come forward. With reduction of unorganized dairy sector, this problem can be reduced. Structured marketing facilities and extension services can improve the situation further.

Indian farmers may face the tough time due to import of milk and milk products under WTO. Hence, cost reduction both in milk production and processing is needed for the survival of farmers. Production of value-added products shall give better return to the dairy entrepreneurs. Production of low and high fat milk for consumption of general customers and selected customers respectively can fetch better revenue for dairy farmers (Hegde 2001). Farmer producers can avail better price margin when they can sell their produce directly to consumers. The similar observation was found from the survey conducted sometimes ago (Verma *et al.* 1997). Milk was supplied to consumers, Halwai and vendor at an average price of Rs.5.68 per litre, Rs.4.75 per litre and Rs.4.04 per litre, respectively. It indicates that the dominance of middleman becomes prominent in absence of co-operative infrastructure. Middleman exploits needy milk producers (Shah 2000).

Cost structure of milk production, breed variety, maintenance of animals etc. have significant impact on profitability and sustainability of concerned enterprises. Adequate attention and continual improvement are needed for these aspects (Reddy *et al.* 2004). Infrastructure and facility, size of farm, processing capacity, quality as well as cost of milk production are integral part in global competition (Ohlan 2012). Growing demand for healthy products has made the milk and milk products more popular. Various combinations of fat and solids-non-fat have made full-cream milk, standardized milk, toned milk and skimmed milk to find its' usage with expected market value. In addition, value added products like ice cream, ghee etc. can earn better business margin (Nicholson and Stephenson 2007).

Population growth, increasing income, changing habits of food consumption, higher income elasticity for dairy products have helped to increase demand of milk or create

opportunities for growth of dairy sector (Rajeshwaran *et al.* 2015). Growth rate of milk production is expected to be at the rate of 4.4% in coming times in India. However, demand for milk is estimated to grow at 7% per annum. Demand for milk shall further grow over the coming years due to higher expenditure elasticity of low income rural and urban families (Karmakar and Banerjee 2006). India's dairy industry is projected to grow at 15 % compound annual growth rate during 2016-2020. It may reach market value of Rs 9.4 trillion on rising consumerism (The Press Trust of India Ltd. 2017). India, in spite of being largest producer of milk, has insignificant share in global trade (Landes *et al.* 2017). Indian companies have the interest in exporting ethnic sweets and ready-to-eat milk products. It has implemented export inspection system, but it is not able to do export due to sanitary and phytosanitary issues (Mukherjee *et al.* 2019).

Socio Economic Impact

Dairy sector has sustainable contribution in generating employment opportunities. As per Shri Radha Mohan Singh, the former Union Agriculture and Farmers Welfare Minister, dairy supports livelihood to 60 million farmers in India. Out of this, two third are small, marginal and landless labourers (Press Information Bureau 2016). Dairy Farming supplements the earning of small and marginal farmers (Jaiswal *et al.* 2018). It is a significant contributor to the disposable income of farm households (Singh and Joshi 2008). Dairy Sector not only generates employment opportunities but also supports ecological balance and sustainability (Dhanabalan 2009). Demand for food of animal origins to grow higher in developing countries due to increasing human population, rising per capita income and increasing urbanization (Willaarts *et al.* 2013).

Apart from improvement in productivity or yield, adequate attention is needed towards utilization of cow dung in bio-compost, vermin-compost and bio-gas production (Abubakar *et al.* 2012). Cow dung available from slaughter house is another potential source which may be used for bio-gas production (Johnson *et al.* 2018). It would reduce greenhouse gas effect also. Availability of abattoir for culling of unproductive animal and its' subsequent utilization is another opportunity to make this sector economically sustainable.

Opportunities for investment and subsequent employment in Dairy sector in North East India are quite high. This region, with multiple states having international border, has unique opportunity for developing business relations with South-Asian countries. Act East Policy of the Government of India, Free Trade

Table 1. Summary of Challenges and possible solutions.

Sr. No.	Challenges identified	Possible Solutions	References
1	Technology and Management practice on part of Milk Producers	Datafication to avail tools, technology and processes and its' implementation	Anonymous 2017a
2	Adequate cold chain network across the states in India	Increased chilling centers and logistics through refrigerated van	Meena <i>et al.</i> 2017
3	Protection of Producers' milk selling price	Appropriate milk pricing policy by State Govt. and State Milk Federation, Growth in organized sector	Verma <i>et al.</i> 1997
4	Identification and utilization of consumer insights	Clean Label Milk Products by Milk Processors	Anonymous 2017a
5	Sanitary and phytosanitary issues	Adoption of GMP, importing country standards, process improvements in discussion with WTO & importing country	Mukherjee <i>et al.</i> 2019
6	Strengthening of Co-operative model In West Bengal	Co-operative outreach to milk producers and efficient sales & marketing throughout the state of West Bengal	Sarkar and Ghosh (2010)

Agreement with ASEAN, Pan Asian Highway etc. may be found favorable in this aspect. Market reports indicate the growing interest from co-operatives and the private sector to look for investment and expansion of their existing set up in this region. However, improvement is needed with respect to low surplus production at farmers' end, inadequate marketing infrastructure and inefficient supply chain system.

Impact from Trade Policy

The two key challenges to dairy sector from emerging trade regime are:

- Balancing the interests of producers and consumers
- Balancing the interests of the nation versus sector (Jayakrishna and Rajasekaran 2015).

Balancing the interests of producers and consumers: Expert opinion may be in favour of trade liberalization to address price volatility and levels. Observations from a few countries indicate an insular approach which reduces the effects of volatility. India needs to find a middle path which can safeguard the interests of both producers and consumers.

Balancing the interests of the nation versus sector: Bilateral Trade and Investment Agreement (BTIA) with the European Union includes jobs and growth in favor of National interest. It induces favorable changes in regulations like data security and movement of professionals. This will benefit a few key sectors in India. On the contrary, BTIA is not in the interest of Indian milk producers as they will not get any protection against the subsidized exports. Further, Indian dairies will find it difficult to meet the stringent sanitary and phytosanitary

regulations (Das 2008). Similarly, the Free Trade Agreement (FTA) with New Zealand can also impact the interests of India's dairy sector (Saraswat *et al.* 2018, Jha 2019).

Increase in import can affect the domestic production and status of India's self-sufficiency. Although WTO aims to remove non-tariff barriers including quota restriction, quality issues, direct subsidies etc. but actually, the EU and United States are utilizing this tool to manipulate while putting restriction to free and fair competition (Joshi 2015).

CHALLENGES AND OPPORTUNITIES OF DAIRY SECTOR: STATE (WEST BENGAL) PERSPECTIVE

Less availability of artificial insemination (AI) centers, distress sell, non-remunerative price of milk are a few major hindrance in dairy sector of West Bengal (Bera *et al.* 2018). Besides, lack in adoption of co-operative model and absence of high yielding milch animals have been proven critical in steering growth in spite of market demand throughout the state.

Physical Constraints: Steep slope, soil erosion, heavy rain fall, high humidity, intense cold of Northern Hilly region are unsuitable for rearing livestock population. Non-availability of fodder crops and scarcity of water in many parts of Purulia, Bankura, part of Paschim Medinipur, Bardhaman and Birbhum districts affect rearing of dairy animals.

Heat Stress: Heat stress affects severely the biological functions of animals. Heat stress impacts the growth, milk productivity and reproductive capacity of livestock

population (Rorie 2015). Heat stress effect is high in Purulia, Paschim Medinipur, Dakshin Dinajpur, Maldah, Bardhaman, Birbhum, North 24 Parganas and South 24 Parganas.

Socio-Economic Constraints:

i) Lack of skill, technological knowledge and extension education of livestock owners, lack of training facilities (Singh *et al.* 2014).

ii) Producers' poverty.

iii) Lack of improved livestock population, inadequate artificial insemination facilities, lack of adequate veterinary centers, vaccination (Bera *et al.* 2018).

iv) Lack of dry and green fodder, lack of grazing, pastureland and agricultural land (Bera *et al.* 2018).

v) Problems faced by abattoirs, poor management of animal wastes, cattle smuggling.

vi) Poor marketing facilities.

Economics of Milk Production: Involvement of people at large and their participation as stakeholder in the business can steer the growth of the Milk Co-operatives. Sarkar and Ghosh (2010) computed cost, return and relative profitability of co-operative and non-cooperative milk producers' in West Bengal. As per their study, Co-operative farms have much higher profitability and Non-Below Poverty Line farms working under both cooperative and non-cooperative format have been benefited more than BPL farms. Therefore, development of co-operative sectors, and necessary policy and other supports for Non-BPL farms may be worked out for boosting dairy based economy in West Bengal.

Scope in West Bengal: West Bengal has both the availability of raw milk and market demand for milk and milk products. Milk based Sweet Industry itself is well above Rs.20000 crore (Anonymous 2017d). This can be further enhanced for both domestic and export purposes. Besides, West Bengal needs to strengthen its' Co-operative model in line with Gujarat for a better growth in milk production (Milk production in West Bengal and Gujarat for 2018-19:5.6 and 14.4 million tons respectively (Source: Basic Animal Husbandry Statistics 2019, Government of India). Managing Director of GCMMP has mentioned good prospect of the West Bengal in dairy sector (Press Trust of India Ltd.2017). Amul has already confirmed investment for Rs. 200 crores for new processing plant in this state. Encouraging women especially small and marginal farmers is another potential option to uplift Dairy Farming like Village based Milk Procurement System by Sundarban Milk Union (South 24 Paraganas, West Bengal) under NDP-I (NDDB).

CONCLUSION

Global trend to adopt technology and management practices through Datafication is underway. Developed countries have done significant progress in this direction too. Growth opportunity in milk production through high yielding milch animals and exporting the surplus dairy products to overseas countries are the two prospective areas where India has a wider scope to perform. Although breeding improvement research and studies have been taken up but endeavor in exporting dairy products is still to get momentum. Further study is also needed to formulate comprehensive plan which can make dairy farming occupation sustainable even for crores of small, marginal farmers throughout the country. In view of large numbers of small, marginal farmers in India, all the State Milk Federations can enjoy the economies of scale through proper planning. Utilization of cow dung and culling of unproductive animals need to be integral part of Dairy Farming to make this sector profitable and sustainable. Both intrinsic (genetic potential) and extrinsic factors (nutrition management, farm management, veterinary aids and breed improvement schemes) are to be taken for active consideration to steer the growth of milk production. Although co-operative model has got the success in a few Indian states, but many states are still to get institutionalized. Attention in similar direction shall improve West Bengal's growth path in presence of available market proximity, changing lifestyle and purchasing power of people. West Bengal can look for market expansion of its' ethnic dairy products beyond geographical region besides exploring export potential to South Asian Countries while exploiting its' locational advantage.

Conflict of interest: There is no conflict of interest.

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