Dairy Asia
for health and prosperity

Evolving Appropriate Institutional Structures for Sustainable Dairying: Experiences from India and selected Asian Countries

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Dairy Asia is a multi-stakeholder partnership committed to visioning and building a sustainable dairy sector in Asia and the Pacific region. Please visit www.dairyasia.org for further information about the platform.

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List of Abbreviations

CLDDP	:	Community Development and Dairy Development Programme
EEC	:	European Economic Community
EIA	:	End Implementing Agencies
GDP	:	Gross Domestic Product
GHI	:	Global Hunger Index
Ha	:	Hectare
ICAR	:	Indian Council of Agriculture Research
Kg	:	Kilogram
NDDB	:	National Dairy Development Board
NDP	:	National Dairy Plan
NGO	:	Non-Government Organization
NSSO	:	National Sample Survey Organization
OF	:	Operation Flood
USD	:	US Dollar

1. Indian perspectives

The report of Global Hunger Index (2015), released recently, observed that the developing world has made considerable progress in reducing hunger since 2000. In the developing world the Global Hunger Index (GHI) has dropped by 27%. Yet the state of hunger in the world remains serious. The highest hunger levels are found in Africa South of the Sahara and in South Asian countries. In India, according to the report, undernourished population stands at 15%, incidence of stunting among the children under-five years of age is 39% and under-five mortality is estimated at 5%.

In India, milk plays a critical role in addressing hunger and malnutrition. With other family attributes remaining the same, the per capita consumption of milk is three times higher in the milk producing households compared to non- producing households. In the poor and marginal milk producing households, the difference in milk consumption is even higher – approximately four times. This diversity is not seen in other items of consumption basket. It suggests that family based milk production system influences milk consumption and nutritional security positively. The recently released national consumer survey data of NSSO (68th Round/2011-12) substantiates this point.

Category		**PRODUCERS**		**NON-PRODUCERS**		**Ratio of milk consumption: Producer to Non-Producer**
		Households in each category (%)	**Milk consumption per capita** (litre/month)	**Households in each category** (%)	**Milk consumption per capita** (litre/month)	
Poor	(0 - 20%)	10	3.6	17	0.9	4.0
Lower Middle	(20 - 40%)	17	5.0	19	1.8	2.8
Middle Middle	(40 - 60%)	22	6.3	19	2.6	2.4
Upper Middle	(60 - 80%)	25	8.3	22	3.7	2.2
Rich	(80-100%)	27	13.6	24	5.3	2.5
Overall		**--**	**7.9**	**--**	**2.8**	**2.9**

Figure 1: Per capita household consumption of milk by the milk producing and non- producing families **(**Source: Estimates from Unit Level data of NSSO, 68th Round, 2011-12*)*

Milk production in India is not viewed simply as production of a commodity, as in the advanced milk producing countries. On the contrary, milk production is perceived as an instrument of income security, employment, women empowerment and social status. Cows are reared in many households with the respect almost equal to a member of the family. As milk production operations are

conducted with help of family labour and the bulk of the feed is crop residues and by-products with limited land used for fodder production, Indian dairying adds economic value to resources such as family labour and feed that otherwise have limited economic value in large parts of the country. This gives Indian smallholder a competitive edge over input driven intensive milk production. As it is relatively less dependent on purchased inputs, milk production is largely insulated from risks in factor market, an essential feature for sustainable production.

2.1 Employment and contribution to Economy

In India, dairying is widely recognized as an instrument of social and economic development. The nation's milk supply comes from millions of small producers, dispersed throughout the rural areas. These farmers maintain an average herd of one or two milch animals, comprising cows and buffaloes. The animals' nutritional requirements are largely met by agricultural waste and by-products. Ample labour and a small land base encourage farmers to practice dairying as an occupation subsidiary to agriculture. While income from crop production is seasonal, dairying provides a stable, year-round income, which is an important economic incentive for small farmers to take to dairying.

Milk production in India is dominated by small and marginal landholding farmers and by landless labourers who, in aggregate, own about 70% of the national milch animal herd.

For crop production, about 60% of India's agricultural land depends on rain; it is also prone to both drought and floods, rendering agricultural income uncertain for most farmers. Shackled to subsistence production as a result of shortage of finance and credit facilities, these farmers become entangled in a vicious debt cycle. The combination of an unfavourable man-to-land ratio and fragmented landholding makes it difficult to support large families on crop income alone. It is not surprising that the small farmer and the landless labourer are more often than not victims of moneylenders and of natural calamities.

The analysis of NSSO data of 70th Round indicate that livestock sector is the third most significant source of income for rural households accounting for about 12% of income for all sizes of land holding groups and is more than 25% of income in case of households with very smallholdings of area up to 0.01ha.

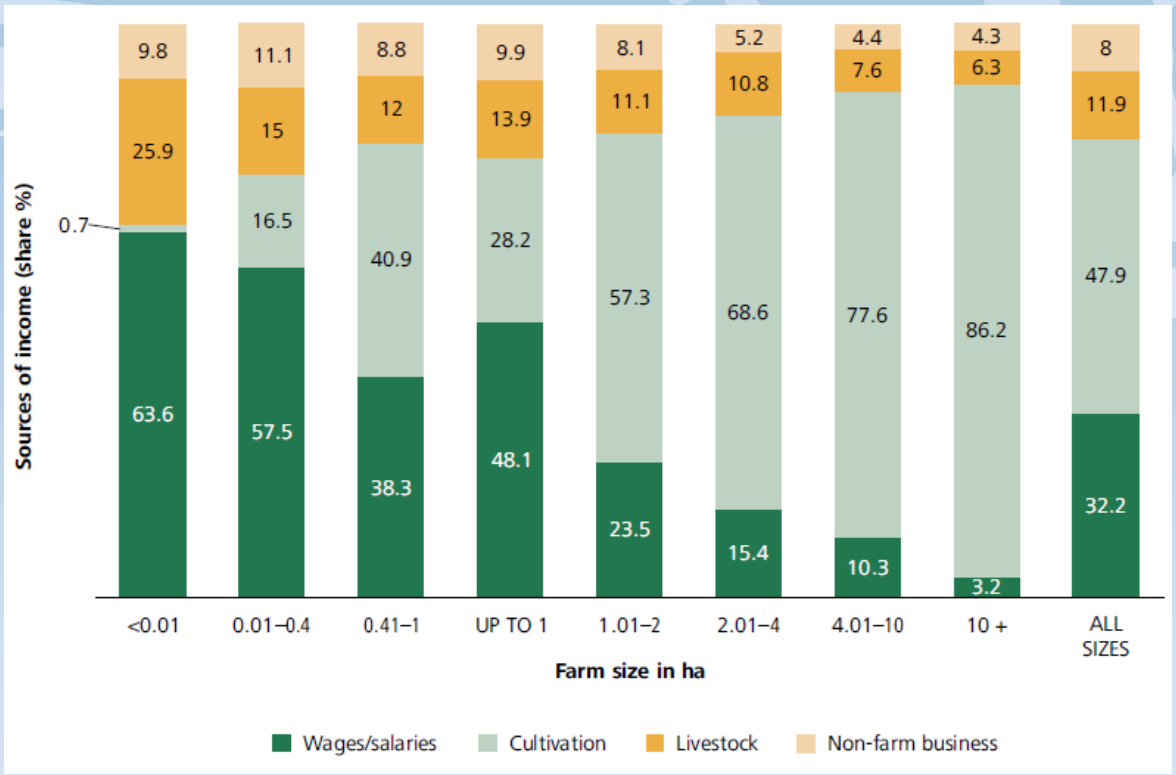


Figure 2: Major Sources of income in rural areas by Land Holding Group

Dairying, as a subsidiary source of income, is a source of economic relief to most of these weaker groups in the society. Often one or two milch animals enable these farmers to generate sufficient additional income to break the vicious subsistence agricultural-debt cycle.

The Indian dairy development program Operation Flood (OF) has shown how food aid can be used as an investment in creating and strengthening an appropriate institutional infrastructure that can promote dairy development nationally. Programmes with similar policy orientations, may prove to be appropriate to dairy development in other Asian as well as African countries since the conditions that prevail in dairying today in a number of developing countries are comparable to those that once were found in India with a focus on creating sustainable strong institutions which can stand the test of time.

2.2. Institutional Structure and Operation Flood

Operation Flood, the World's largest Dairy development program, availing dairy aid under World Food Program, European Economic Community (EEC) commodity aid and loan and grant from the World Bank during the period 1970 – 1996, aggressively promoted and nurtured a 3-tier dairy cooperative structure in the country.

Replication of the three-tier "Anand pattern" throughout the country demonstrated that the smallholder dairy system can work efficiently through this institutional mechanism and can contribute to the growth in milk production, milk supplies and income level of farmer members. In terms of economic and social sustainability the institutional framework proved to be a success as the policy makers even today are promoting dairy development models under the above framework. The cooperative institutions on their part achieved higher outcomes than expected in terms of impact on other social and economic dimensions as well as meeting the targets for the Operation Flood Project. Under this institutional structure, the village level dairy cooperative societies are organised to aggregate milk from their members of which about 90% are small milk producers. Transparency is ensured through practices such as determining procurement price of milk on the basis of its intrinsic quality. The milk offered by producers is weighed and paid on the basis of volume and quality considerations. These village level cooperative institutions transfer year- end profit to their member producers on the basis of their actual patronage, thereby eliminating any individual bias in profit sharing. Accounts are audited and audit class status is granted. Each cooperative society conducts Annual General Body meetings and information on profit and loss accounts are shared with the members, enhancing transparency in the grass root level business operation.

The Operation Flood was implemented in three phases- Phase I (1970-1981), Phase II (1981-85) and Phase III (1985-96). While the foundation of the program was laid in Phase I, Phase II was a period of geographic expansion of the program to cover a much wider territory and Phase III had the principal objective of consolidating the gains of Operation Flood. In the evaluation report, the World Bank observed that an incremental volume of 40 million tons milk was produced in India during the project implementation period which could be directly attributed to the project.

At the end of Operation Flood, there were 170 district level milk unions, covering 73,000 village level cooperative societies and about 10 million producer members in the cooperative ambit, of which about 20% were women members. The dairy cooperative structure covered 352 districts of 23 states with a cumulative milk collection of about 11 million kg per day and milk marketing of 10 million litres per day. The National Dairy Development Board (NDDB) continued to finance and provide technical support to the dairy cooperatives for sustainable dairy

development. The cooperative way of dairying gives millions of rural producers the opportunity to use dairying as a way out of poverty and hunger.

At present the dairy cooperatives pay about USD 7 billion annually to producer members. This has led to milk becoming the single largest agricultural commodity valued at USD 55 billion, surpassing even the combined value of paddy and wheat.

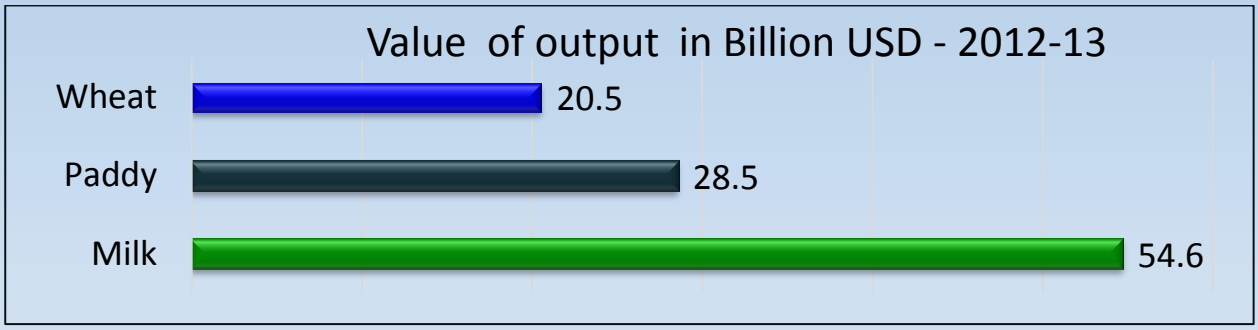


Figure 3: Output value of different agricultural commodities in India

Subsequent to Operation Flood, the new challenge for the Dairy Industry was to explore ways to emerge stronger using the network created under Operation Flood. The response to that was Perspective Plan 2010, a plan that attempted to take the dairy cooperative movement to its highest potential focussing on four thrust areas viz Strengthening Cooperative Business, Production Enhancement, assuring Quality and creating a National Information Network.

Much has been achieved in the progress of Indian dairying during the last four and half decades (1970s through 2000s) following the path of cooperative dairying. However, sustained economic growth in the 2000s, associated with urbanisation and changes in the life styles, led to changes in the structure of food demand in favour of milk and dairy products

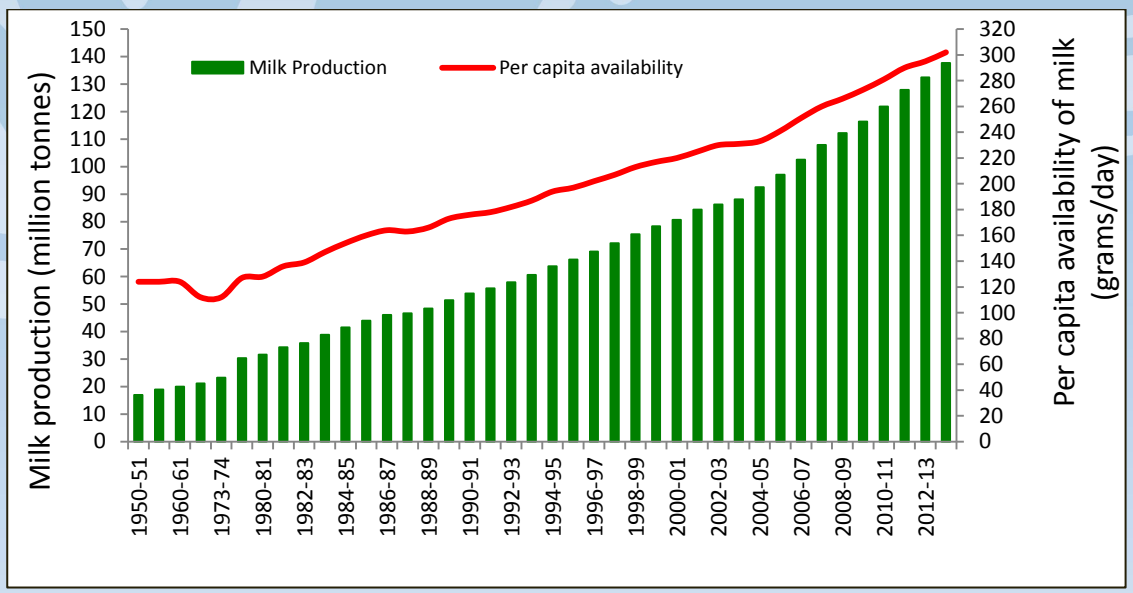


Figure 4: Historical milk production and per capita availability in India

In the last 45 years, India's smallholder dairy system has contributed substantially to increase the national milk production by five-fold, from about 22 million tons in 1970 to 146 million tons in 2014-15. Domestic milk availability per capita currently is around 320 grams per day. Some 70 million rural people are engaged in milk production, of which the small and marginal farmers and the landless account for a very large proportion.

Emerging trends indicate that the demand for milk is now growing much faster and is likely to be about 155 million tons by 2016-17 (end year of 12th Five Year Plan) and between 200 and 210 million tons by 2021-22. To meet the growing demand for milk, the average incremental increase in milk production will have to be about six million tons per annum over the next 15 years, compared to an average of about three million tonnes over the last 15 years.

Unless milk production increases at the pace required, there is a possibility of a widening gap in demand and supply of milk, which could lead to a dependence on imports. It is, therefore, imperative that a scientifically planned multi-state initiative is launched at the earliest, to increase milk production by increasing milch animal productivity in existing herds through a focussed and systematic process for breeding and feeding. The National Dairy Plan (NDP) had been envisaged with a 15-year horizon, considering that three to five years are required to produce a more productive animal and it takes time to develop and expand the systems that support efforts to increase milk production.

The first phase of the National Dairy Plan (NDP I) is being implemented now, covering the period 2011-12 to 2018-19. The objectives of NDP I are: (i) to help increase the productivity of the milch animals and thereby increase milk production to meet the rapidly growing milk demand and; (ii) to help provide rural milk producers with greater access to the organized milk processing sector.

The project is being implemented through End Implementing Agencies (EIAs) such as the State Cooperative Dairy Federations, District Cooperative Milk Producers Unions, State Livestock Development Boards, Registered Societies/Trusts (NGOs), Section 25 Companies, subsidiaries of statutory bodies, ICAR Institutes and Veterinary/ Dairy Institutes/ Universities that meet the criteria for each activity.

The dairy cooperatives are now spread across 1.6 million villages covering 15.4 million members of 210 milk unions operating in about 440 districts. In 15 States, State level milk federations have been created to oversee, provide direction and undertaking marketing functions of the milk unions. Milk collection now stands at 38 million kg per day and liquid milk marketing has crossed a level of 31.2 million litres a day. What is noteworthy is that the liquid milk marketing by the cooperatives now covers about 4,000 urban centres out of the total towns of about 8,000 in the country.

1.3 Key lessons learnt

The experiences of the Operation Flood brought out many important lessons. It showed that a single-commodity project can have multidimensional impacts; but to run the project well, it needs participatory organisations and a commercial approach.

Keeping the farmers engaged in dairying is a challenge for which the most critical factors are to maintain a fair price that continues to make dairying viable and a transparent and fair procurement system that by design, acts as non-opportunistic buyer of raw milk from the producers. Milk production-enhancement services are important but producers will not use them unless they are paid a fair price through a transparent and fair procurement system.

A protective market environment is necessary for providing an incentive to increase domestic production, especially in a sector where use of subsidies for both production and export have been used by some of the more developed dairying

countries. As Operation Flood was based on a cooperative dairy development model, industrial licenses for new plants and/or expansion were provided to dairy cooperatives as part of their plans to increase their farmer membership. At the same time, the possible negative impact of dumping dairy commodities by countries with surplus stock or shortages created in domestic market was avoided through canalization of both imports and exports, which ensured that domestic prices incentivized domestic production.

Even as sustained efforts is made to strengthen the existing dairy cooperative structure, with structural and functional changes that are relevant and appropriate in the context of a public policy that favors a market driven competitive economy, complementary institutional structures need to be used, and institutional innovation has to be encouraged.

Even though the achievements of the dairy cooperative network setup under the various phases of Operation Flood have been impressive, there have also been concerns about the regulatory framework governing cooperatives which has hampered their efficient functioning in a liberalized economic environment. There have been two major initiatives at the national level on the regulatory framework for producer institutions namely (i) Legislation enabling registration of producer companies and (ii) Amendment to the Constitution on cooperative legislation. While producer companies based on similar principles provide an alternate institutional framework with the flexibility and autonomy enjoyed by companies, the amendment to the Constitution envisages that the necessary autonomy and independence to cooperatives are provided under the cooperative legislation.

The principal learning is that when a large number of small producers organize themselves into a cooperative they assume command of procurement, processing and marketing of their produce and can be assured of a fair and stable price for their marketed surplus. It is only by enabling such cooperative organisation to emerge and develop into strong and viable institutions that prosperity can be ensured for millions of farmers.

Operation Flood and the NDDB enjoyed support from the highest levels of political leadership. During the implementation of Operation Flood phases, the government of India had directed all State Governments that dairy development was to be supported through a cooperative basis following an institutional structure that was already working well in Gujarat.

2 Role of Dairying in Institution Building- Experiences from select Asian countries

Dairying and milch animal rearing has been ingrained as important traditional and cultural occupation in most of the Asian countries. Milk and dairy products also form an important part of Asian diets even as the productivity of the milch animals and rearing practices vastly differ from their western counterparts. Due to a large population and low productivity as compared to western countries, the per capita availability of milk remains low in Asia with about 64 kg per person per year in comparison to the global average of 109 kg per year per person and 310 kg per person in some advanced dairying nations such as Australia.

Demand for dairy products in the Asian region has doubled since 1980s and after more than half a century of declining real prices for dairy products there are strong signs of a structural change in the global dairy sector that could make it attractive for investment. This offers livelihood and rural development opportunities for smallholder dairy producers in Asia who currently supply three-quarters of domestic consumption needs in a region projected to be the largest growing market over the next decade. There are many successful business models through which smallholder milk producers in Asia have gained sustainable access to markets.

In few Asian countries milk may not be an integral part of people's diets and there is a greater preference for meat based products. There is an imperative need to promote milk and milk based products in these regions. This gains much more importance in modern era and in the future as we are constantly looking for avenues to cut down on emissions and make each and every process more and more environmental friendly. As per some estimates, about 290 kg equivalent of carbon dioxide is released in the atmosphere for a kilogram of protein derived from beef as opposed to just 80 kg for a kilogram of protein derived from milk from dairy cattle respectively. It is also less for small ruminants, where 190 and 130 kg of carbon dioxide are released respectively for obtaining a kilogram of protein. Thus promoting milk over meat may have significant positive impact on the environment in both short and long term.

India's success in dairying has been duly acknowledged and expressed by the World Bank through various publications. There are some important lessons to be learnt of this development, especially for the smallholder dairying systems which is

prevalent in all the Asian countries. Some of the lessons learnt from selected Asian countries are listed below.

2.1 Bangladesh

In Bangladesh more than 80% of the households are located in rural areas. An estimated two-thirds of those households own livestock. More than half the population owns less than 0.5 acres; the bottom 40% possesses just 3% of the total land area; 48% live below the poverty line; and 30% consume less than 1900 calories per day (the minimum desired level is 2300 calories). Undernourishment prevails in 16.4% of the Bangladeshi population according to the GHI report (2015). Stunting is as high as 36% in children below 5 years and wasting and mortality is 14% and 4% percent respectively in the same age group.

Agriculture generates two-thirds of total employment, contributes a quarter of total export earnings and provides food security to the increasing population. Crop production and animal husbandry are interdependent in the country's mixed-farming system, with livestock performing multiple functions, including the provision of food, nutrition, income, savings, draught power, manure, transport and other social and cultural functions. With livestock, people who are poor and landless can still access common property resources, such as roadsides, open grazing areas and water bodies. Cattle are by far the most important farm animals; smallholders possess the majority of them, and they are directly linked to family income, nutrition and welfare.

The livestock sector contributes to about 3% of GDP, or to about 18% of agricultural GDP. When the indirect benefits of draught power and manure for fuel and fertilizer are added to the direct economic output of meat, milk and hides, the value added of the livestock subsector almost doubles to about 6% of GDP. Livestock also provides critical cash reserves and steady cash incomes for many marginal farmers who grow crops essentially for subsistence or who have little or no land at all.

Until quite recently, milk was a by-product of cattle, used largely for making traditional sweets and in tea. Per capita milk availability currently ranges from 40 to 50 g per day (14–18 kg per year). The gap between supply and demand is largely

met by milk powder imports of about 20,000 tons annually, valued at USD 70 million. Although there is no specific nutritional target in the country for milk consumption, the figure of 250 g per day (90 kg per year) often appears in national plans, implying an annual milk supply requirement of 12.8 million tons – more than five times current production

There are important lessons that have shaped smallholder milk production since organized dairying started in the latter half of the twentieth century in Bangladesh.

Long-term support from the Government and development partners kick-started the involvement of smallholders into formal dairy value chains; but schemes to promote larger, more intensive dairy farms have been largely unsuccessful due to poor services and market access.

Successful models in which smallholders benefit from the complete dairy value chain include the Milk Vita Cooperative and the Grameen-Community Development and Dairy Development Programme (CLDDP) models. The Grameen–CLDDP model has been adapted for use in Nepal and inspired the local Grameen Danone Foods social business venture.

There is an increasing awareness among Government, NGOs and the private sector about the significant economic and environmental benefits of sustainable and profitable social dairying in rural areas.

Tens of thousands of very poor rural households have moved out of poverty as a result of the successful introduction of the holistic Milk Vita and Grameen–CLDDP smallholder dairying models. Many families now own up to 20 cows and have intensified and commercialized their milk production. The two models embrace a complete cow-to-consumer package of input and output services, and their on-going scaling up has helped put the dairy sector in Bangladesh in a unique position to take advantage of the recent huge increases in the cost of imported dairy products, especially milk powder, by substituting imports with domestically produced milk

2.2 China

China's population represents one-fifth of the global total, but total dairy production accounts for only 4% of world production. Since the beginning of the twenty-first century, however, the industry has been rapidly growing. This striking development allowed the industry to fill the increasing domestic consumption demands and, more importantly, to provide employment and increased income to small farming households.

Encouraging participation of smallholders in milk production has been a component of national and regional policies to promote regional development and reduce poverty. Large processors also have played a significant role in expanding and keeping smallholders in operation. Through the introduction of centralized milk collection stations, millions of small farmers have entered the sector, particularly in the poor western provinces. This has been supported by enabling policies of central and local governments, especially those that encouraged investments in higher-quality animals and infrastructure.

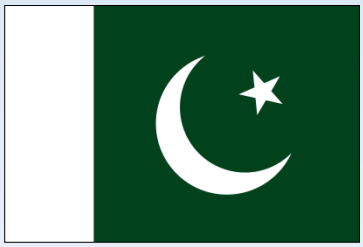
Although China's dairy sector has enjoyed rapid growth, it has encountered challenges - the most visible of which was revealed in the melamine scandal in 2008. The dairy industry is experiencing considerable transformation - the quantity-based expansion is being replaced by the need to ensure milk quality. It is difficult for scattered smallholder dairy farmers to produce the quality of milk that processors and markets require. Developing large commercial dairy farms is unlikely to be a viable model in China, particularly in the medium term. Rather, alternative models in which an enterprise provides a milking station and proper management to smallholder dairy farmers, dairy parks and farmer associations are developed and prove to be practical.

It is clear that the large processors have dominated and will continue to drive the next stage of China's dairy development. Critical to ensuring strong growth in the sector is the development of incentive systems for rewarding good practices to increase milk quality, either market based or institution based. The processors need to take a leadership role in setting up effective premium-based pricing systems to support a sustainable dairy sector and create effective institutional structures.

China's dairy development policies, particularly regional policies, are very much biased towards large dairy farms. The Government needs to promote rural economic growth and improve the well-being of the rural population through increased technical support and financial subsidies. China fares well on the GHI (2015) in comparison to most of the Asian countries with just 9% of the population undernourished and prevalence of wasting and stunting in under-five years of age is 2.3 and 9.4% respectively while mortality in under-five years of age is just 1.3%.

It is also clear that the current oligopolistic economic stage of the sector, owing to smallholder inability to negotiate with the large-scale dairy processing enterprises, results in dispersed smallholder dairy farmers not receiving fair prices for their raw milk. Therefore, dispersed households need to organize themselves and strengthen their capacity to negotiate with enterprises, thus ensuring long-term profitability to their investment and economic activities. The Government should formulate a positive policy to encourage and support the smallholder dairy farmers to establish institutional systems, such as cooperative organizations.

2.3 Pakistan



Pakistan is the sixth most populous country in the world. Agriculture, being the mainstay of the economy, generates about 21% of the total GDP and employs about 43% of the total workforce.

With almost 50% contribution in agriculture, livestock is by far the most important subsector in agriculture, growing with an average of 6% per annum.

The higher growth in the livestock sector has been mainly attributed to growth not only in the headcount of livestock, which is commercially important, but also in milk production. Within the livestock sector, milk is the largest and single most important commodity. Pakistan is the fifth-largest milk producer in the world. Despite proximity to milk-deficit regions, including Central Asia and the Middle East, Pakistani producers do not export their products.

According to GHI (2015), one fifth of the population suffers from undernourishment. Among other indices of hunger, 45% of children under-five years of age are stunted, 10% are wasted and under-five mortality rate is estimated at 8.6%.

Despite being the most lucrative livestock product, milk production is the least commercialized enterprise in the agricultural economy. As is the case with most of the Asian countries, the majority of the national livestock herd is distributed in small units throughout the country. Millions of landless or smallholder farmers produce the bulk of the country's milk supply.

About 80% of the milk in the country is collectively produced by rural commercial and rural subsistence producers. The peri-urban producers account for 15% of the total production, whereas urban producers contribute 5%. Little over half of the dairying households owned 1–4 animals, 28% of dairying households maintained herd sizes of 5–10 animals; another 14% had herds of 11–50 animals. Only 7% of the dairying farms in the country could be considered large, with more than 50 animals.

The local government is authorized to fix the price of milk on the pretext that it is an essential commodity which proves to be a major hindrance for the development of the dairy sector. However, the prices of inputs are not regulated in the same manner which keeps increasing with the growing inflation.

A critical lesson is that organizing local farmers around a profitable initiative is a possible goal to achieve within the current context of the Pakistani dairy industry. However, such an initiative requires comprehensive measures instead of a limited focus on production. These measures range from encouraging farmers to form groups by providing support in the areas of technology transfer, market links and enterprise management.

At the national level, a concerted response from both the Government and the private sector to enable the participation of smallholder dairy farmers in dairy markets and to help them competitively supply expanding consumer markets can only be achieved through proper institutional design.

Often, lessons learned from countries with different socio-economic and climatic environments are presented for replication in Pakistan, resulting in unanticipated outcomes. To succeed in applying models or measures that were successful in other countries, it is recommended to embrace those that worked in countries with a similar socio-politico-economic profile.

3. Conclusion

The rapidly changing demographics, increase in urban centres, changes in lifestyle coupled with increase in the disposable income is a phenomena in all major Asian countries. This trend inter alia will lead to an increased demand of milk and milk products especially value added products like cheese, ice cream, yoghurt, nutraceutical and milk based personal care products. Therefore, it is imperative that we increase the milk production and outpace the growing demand which can be achieved by enhancing the productivity of livestock through scientific interventions such as breeding and feeding.

India has been a self-sufficient country in terms of its dairy requirements but many of the other Asian countries are heavily dependent upon imports. As much as USD 14.7 billion was spent by Asian countries in 2012 towards importing milk and milk derived products. This is a huge outflow in terms of foreign exchange which cannot be avoided as milk and milk products are deeply embedded in culture and diets of Asian people. And for all this to happen, strong institutional structures must be put in place to optimally utilise each and every opportunity that dairying provides in a professional and efficient manner.

The various Governments have to take a conscious decision and promote dairying not only as occupation but as a small scale enterprise to reap the dividends which dairying has to offer. Our Indian experience has shown that dairying not only plays a vital role in financial and social security of the marginalised and poor but also ensures nutritional security among those engaged in dairying especially among the small and marginal holders.

Milk is often regarded as a complete food as it is source for most of the nutrients and vital vitamins and minerals. Milk is critical for cognitive and physiological growth in children. Recent government data has shown that in India the households that are engaged in dairying consume almost 2 to 4 times more milk and milk products than the households that do not rear milch animals. This huge divergence is not seen in other food items such as cereals, pulses, vegetables, fruits, edible oil, eggs, meat and fish. Therefore, one can assume the critical role milk must be playing towards fulfilling the nutritional requirements of the households especially among the less privileged segment.

Eradication of hunger is our social and moral responsibility. Milk could prove to be the most eco-friendly alternative in achieving this goal as the supply of the nutrients in the form of milk-proteins and milk-fats to the needy cannot be more environment-friendly than any other means.

Dairying also acts as an insurance against unforeseen and unfavourable circumstances such as drought, floods and erratic monsoons. It ensures a steady and alternate source of income during these stressful times and helps farmers tide over the untoward times. It has potential to transform lives of rural, agrarian population which predominantly remains in small-holder systems. It assumes greater significance in areas where there is lack of irrigation facilities and in arid or semi-arid zones.

Asian countries and particularly South East Asian Countries have greater homogeneity in demographics, income, lifestyle, culture and climatic conditions. Therefore a similar approach as adopted by India for dairying may prove highly effective in the rest of the Asian countries as well. Dairying thus has multifaceted benefit of supporting livelihoods and generating employment and ensuring rural well-being.

Figure 5: Average value of import and export of milk and milk products in the period of 2008-2012 (Value in Million USD)

Countries	Average Import Value	Import %	Countries	Average Export Value	Export %
China	3,062	22.5	Singapore	272	9.3
Indonesia	927	6.8	China	215	7.4
Singapore	791	5.8	Malaysia	213	7.3
Philippines	687	5.1	Philippines	129	4.4
Malaysia	664	4.9	Thailand	117	4.0
Thailand	454	3.3	Indonesia	101	3.5
Sri Lanka	273	2.0	India	98	3.4
India	111	0.8	Pakistan	40	1.4
Pakistan	83	0.6			
Other countries(25)	6,545	48.1	Other countries(24)	1,731	59.3
Total	**13,602**	100	**Total**	**2,920**	100

Figure 6: Milk Product-wise average value of import and export of in the period of 2008-2012 (Value in Million USD)

Dairy Products	Average Import value	Import %	Dairy Products	Average Export value	Export %
WMP	3,756	30.7	WMP	1,032	39.0
Cheese	2,864	23.4	Cheese	703	26.5
SMP	2,497	20.4	Milk	362	13.7
Whey, dry	975	8.0	SMP	249	9.4
Butter, cow milk	941	7.8	Buttermilk, curdled, acidified milk	169	6.4
Milk	569	4.7	Butter, cow milk	79	3.0
Lactose	355	3.0	Whey, dry	39	1.5
Buttermilk, curdled, acidified milk	278	2.3	Lactose	15	0.6
Whey, condensed	8	0.1	Whey, condensed	0.2	0.01
Total	**12,245**	**100**	**Total**	**2,649**	**100**

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