

World Wide Dairy Development – At A Glance

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INTRODUCTION

Milk is as ancient as mankind itself, as it is the substance created to feed the mammalian infant. All species of mammals, from man to whales, produce milk for this purpose. Many centuries ago, perhaps as early as 6000-8000 BC, ancient man learned to domesticate species of animals for the provision of milk to be consumed by them. These included cows, buffaloes, sheep, goats, and camels, all of which are still used in various parts of the world for the production of milk for human consumption. Fermented products such as *cheese* were discovered by accident, but their history has also been documented for many centuries, as has the production of concentrated milks, butter, and even ice cream.

The role of milk in the traditional diet has varied greatly in different regions of the world. The tropical countries have not been traditional milk consumers, whereas, the more northern regions of the world, Europe (especially Scandinavia) and North America, have traditionally consumed far more milk and milk products in their diet. In tropical countries where high temperatures and lack of refrigeration has led to the inability to produce and store fresh milk, milk has traditionally been preserved through means other than refrigeration, including immediate consumption of warm milk after milking, by boiling milk, or by conversion into more stable products such as fermented milks.

MILK CONSUMPTION AND PRODUCTION

Technological advances have only come about very recently in the history of milk consumption, and our generations will be the ones credited for having turned milk processing from an art to a science. The availability and distribution of milk and milk products today in the modern world is a blend of the centuries old knowledge of traditional milk products with the application of modern science and technology.

The total milk consumption (as fluid milk and processed products) per person varies widely from high in Europe and North America to low in Asia. However, as the various regions of the world become more integrated through travel and migration, these trends are changing, a factor which needs to be considered by product developers and marketers of milk and milk products in various countries of the world. Even within regions such as Europe, the custom of milk consumption has varied greatly. Consider, for example, the high consumption of fluid milk in countries like Finland, Norway and Sweden compared to France and Italy where cheeses have tended to dominate milk consumption. When you also consider the climates of these regions, it would appear that the culture of producing more stable products (cheese) in hotter climates as a means of preservation is evident. Table-1 illustrates per capita consumption of milk and milk products information from various countries of the world.

From the Table 2, it is clear that the composition of milk is different for different mammalian species for 100g of fresh milk. The value of protein, fat, carbohydrate and energy are more in water buffalo's than other mammals. The role of milk in nature is to nourish and provide immunological protection for the mammalian young. Milk and honey are the only articles of diet whose sole function in nature is food. It is not surprising, therefore, that the nutritional value of milk is high.

✳ **Marketing Area:** A marketing area is an area designated in a Federal milk order's provisions within which the handling of milk is regulated by the order. Generally, the size of the marketing area is determined by the sales territory of competing handlers. The recent consolidation of orders also looked at overlapping areas of milk supply, the number of handlers within the area, natural boundaries, cooperative association service areas, common regulatory provisions, and milk utilization in common dairy products.

✳ **Producer:** A producer is usually any dairy farmer who sells milk to a pool handler. Producers must produce milk in

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Table 1 : Per Capita Consumption Of Milk And Milk Products In Various Countries

Country	Milk Drinks (litres)	Cheeses (kg)	Butter (kg)
Finland	183.9	19.1	5.3
Sweden	145.5	18.5	1.0
Ireland	129.8	10.5	2.9
Netherlands	122.9	20.4	3.3
Norway	116.7	16.0	4.3
Spain	119.1	9.6	1.0
Switzerland	112.5	22.2	5.6
United Kingdom	111.2	12.2	3.7
Australia	106.3	11.7	3.7
Canada	94.7	12.2	3.3
European Union (25 countries)	92.6	18.4	4.2
Germany	92.3	22.4	6.4
France	92.2	23.9	7.3
New Zealand	90.0	7.1	6.3
United States	83.9	16.0	2.1
Austria	80.2	18.8	4.3
Greece	69.0	28.9	0.7
Argentina	65.8	10.7	0.7
Italy	57.3	23.7	2.8

Source: International Dairy Federation, Bulletin 423/2007

Table 2 : Composition of Milk from Different Mammalian Species (Per 100g Fresh Milk)

Animal	Protein (g)	Fat (g)	Carbohydrate (g)	Energy (kcal)
Cow	3.2	3.7	4.6	66
Human	1.1	4.2	7.0	72
Water Buffalo	4.1	9.0	4.8	118
Goat	2.9	3.8	4.7	67

Source: Webb, B.H., A.H. Johnson and J.A. Alford. 1974. Fundamentals of Dairy Chemistry. Second Ed. AVI Publishing Co., Westport, CT., Chap. 1

compliance with Grade A inspection requirements, and their milk must be either received at a pool plant or diverted to a non-pool plant for the account of a pool handler. Producer-handlers are not producers.

✳️**Handler:** A handler is a person--an individual, partnership, corporation, association, or other business unit, that is subject to the provisions of an order. A handler can be an operator of a plant that is approved by a duly constituted regulatory agency for the handling of Grade A milk. A handler also can be a milk distributor or a broker. A cooperative association that does not operate a plant can be a handler.

✳️**Pool Handler:** Pool handler is a handler that is subject in full to the provisions of the order. A pool handler can be an operator of a plant that meets the minimum performance standards included in each order, a pool plant. Such plants include distributing plants, plants primarily engaged in processing packaged fluid milk products, and supply plants, plants primarily engaged in producing manufactured dairy products. A cooperative association that does not operate a plant can be a pool handler. A milk distributor or broker cannot be a pool handler.

✳️**Receipts of Milk:** FMO statistics include volumes of milk received by handlers regulated under each of the Federal orders. Receipts of milk principally come from producers. The volume of milk that is reported as received by handlers from producers includes all such milk regardless of where it may be sold. Milk identified as that received from

producers for a given market may come directly from nearby producers or from producers associated with a supply plant which, although located several hundred miles from the marketing area, is pooled on the market. Producer milk may also include milk that is diverted by a pool plant operator to another pool plant or to a non pool plant. Here follows two lists of countries by milk production (MT = million tonnes).

Table 3 depicts world milk production not including European Union countries and Table 4 shows the milk production data for EU countries. The EU is the largest milk producer in the world, with 143.7 million tonnes in 2003. This data, encompassing 25 member countries, can be further broken down into the production of the original 15 member countries, with 122 million tonnes, and the new 10 mainly former Eastern European countries with 21.7 million tonnes.

Table 3 : World Milk Production Not Including Countries In The European Union

Rank	Country	Production (MT/yr)
1	India	96.1
2	United States	67.2
3	Russia	32.8
4	Brazil	23.3
5	China	16.8
6	New Zealand	14.6
7	Australia	10.6
8	Mexico	9.8
9	Turkey	9.5
10	Japan	8.4
11	Canada	8.0
12	Argentina	8.0
13	Switzerland	3.9
14	South Africa	2.6
15	South Korea	2.4
16	Norway	1.6

Source: OECD Agricultural Outlook Tables, 1970-2014,
<http://www.oecd.org/searchResult/html>

India has attained and retained the first rank in milk production in the world. The first five countries in the world producing maximum milk are India, USA, Russia, Germany and China. Today, India is 'The Oyster' of the global dairy industry. It offers opportunities galore to entrepreneurs worldwide, who wish to capitalize on one of the world's largest and fastest growing markets for milk and milk products. A bagful of 'pearls' awaits the international dairy processor in India. The Indian dairy industry is rapidly growing, trying to keep pace with the galloping progress around the world. The liberalization of the Indian economy beckons to MNCs and foreign investors alike.

In India, milk production increased from 17 million tons in 1950-51 to 84.6 million tons in 2001-02 and is expected to reach 88 million tons during 2002-03. Therefore, from being a recipient of massive material support from the World Food Program and European Community in the 1960s, India has rapidly positioned itself as the world's largest producer of milk. Milk production in India during the last five decades is shown in Figure 1. Table 5 shows the annual growth rate of production of major livestock products in India. Table 6 shows the growth rate of milk egg and wool in India.

Figures 1 and 2 shows that the milk production and milk consumption in the country was stagnant during the 1950s and 1960s, and annual production growth was negative in many years. The annual compounded growth rate in milk production during the first decade after independence was about 1.64 percent; during the 1960s, this growth rate declined to 1.15 percent. During the late 1960s, the Government of India initiated major policy changes in the dairy sector to achieve self-sufficiency in milk production. Producing milk in rural areas through producer cooperatives and moving processed milk to urban demand centers became the cornerstone of government dairy development policy.

Table 4 : Milk Production Data For EU Countries

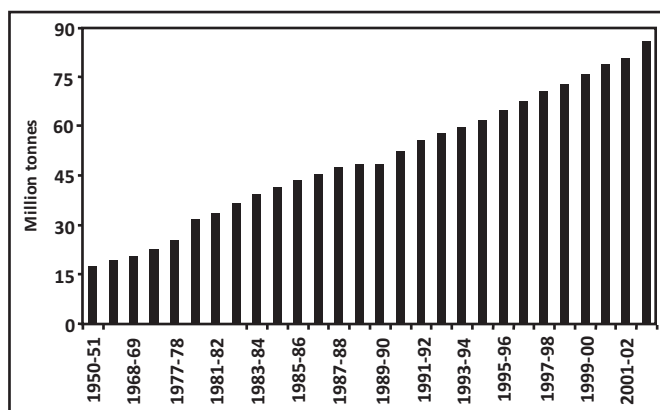
Rank	Country	Production (Mt/Yr)
1	Germany	28.5
2	France	24.6
3	United Kingdom	15.0
4	Poland	11.9
5	Netherlands	11.0
6	Italy	10.8
7	Spain	6.6
8	Ireland	5.4
9	Denmark	4.7
10	Sweden	3.2
11	Austria	3.2
12	Belgium	3.1
13	Czech Republic	2.7
14	Finland	2.5
15	Hungary	1.9
16	Portugal	1.9
17	Lithuania	1.8

Source: <http://www.mdcdatum.org.uk/MilkSupply/euproduction.html>.

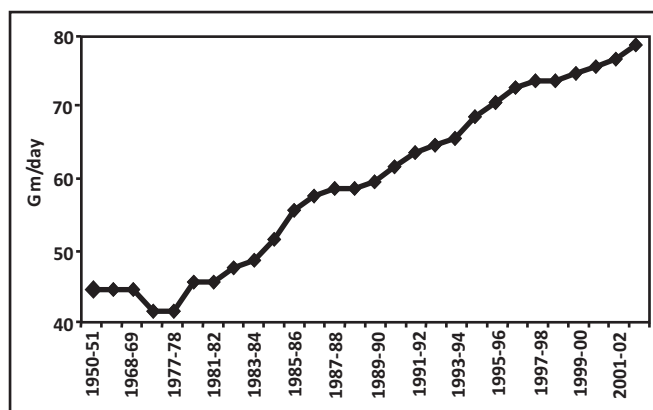
Table 5 : Annual Growth Rate (%) Of Production Of Major Livestock Products In India

Period	Milk	Eggs	Wool
1950-51 to 196-61	1.64	4.63	0.38
1960-61 to 1973-74	1.15	7.91	0.34
1973-74 to 1980-81	4.51	3.79	0.77
1980-81 to 1990-91	5.68	7.80	2.32
1990-91 to 2000-01	4.21	4.46	2.01

Source: GOI, 2003

Figure 1 : Milk Production Trends In India: 1950-51 to 2007-08

Source: GOI, 2008

Figure 2 : Milk Consumption Trends In India: 1950-51 to 2002-03

Source: GOI, 2008

This policy initiative gave a boost to dairy development and initiated the process of establishing the much-needed linkages between rural producers and urban consumers.

Table 6 : Annual Growth Rate (%) Of Milk, Eggs, And Wool In India: 1975-76 Through 2001-02

Plan	Year	Milk	Eggs	Wool
5th Five Year Plan	1975-76 to 1979-80	2.91	3.5	1.49
6th Five Year Plan	1980-81 to 1984-85	6.42	8.4	2.67
7th Five Year Plan	1985-86 to 1989-90	4.37	7.23	1.88
8th Five Year Plan	1992-93 to 1996-97	4.41	4.58	0.80
9th Five Year Plan	1997-98 to 2001-02	4.13	4.34	2.14

Source: GOI, Basic Animal Husbandry Statistics 2002

Table 7 : Milk Production In India

Year	Production (Million Tones)	Per capital Availability (Gms/Day)
1991-92	55.7	178
1992-93	58.0	182
1993-94	60.6	187
1994-95	63.8	194
1995-96	66.2	197
1996-97	69.1	202
1997-98	72.1	207
1998-99	75.4	213
1999-2000	78.3	217
2000-01	80.6	220
2001-02	84.4	225
2002-03	86.2	230
2003-04	88.1	231
2004-05	92.5	233
2005-06	97.1	241
2006-07	100.9	246
2007-08	104.8	252
2008-09	114.4	268

Source: Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, GOI.

The performance of the Indian dairy sector during the past three decades has been very impressive. Milk production grew at an average annual rate of 4.57 percent during the 1970s, 5.68 percent during the 1980s, and 4.21 percent during the 1990s. The country's milk production was expected to reach 84.6 million tons in 2001-02, but it produced only 84.4 million tons.

From 1990 onwards, India has made considerable progress in dairy equipment manufacture as well (Table 7). It is, however, still confined to certain categories such as road tankers, storage tanks, Bulk milk coolers, small homogenizers, milk pasteurizers, milk vending machine and liquid milk packaging system etc. Equipment for packaging of butter, cheese, paneer and other traditional products needs attention with an eye on the industry's need for small and large scale operations. Milk is an essential nutritional requirement of human beings. The children largely depend on milk for nutrition. Higher milk production, therefore, will also increase the health status of the farmers and people at large.

This growth was achieved through extensive intervention by the Indian government, as well as through increased demand driven by population growth, higher incomes, and urbanization (**Candler and Kumar, 1998**). Until 1991, the Indian dairy industry was highly regulated and protected. Milk processing and product manufacturing were mainly restricted to small firms and cooperatives. High import duties, non-tariff barriers, restrictions on imports and exports, and stringent licensing provisions provided incentives to Indian-owned small enterprises and cooperatives to expand production in a protected market. Indian policy makers saw the development of the dairy sector as a measure to create supplementary employment and income among the small and marginal farming households and landless wage earners, as milk production takes place in millions of rural households scattered across the country.

Despite its being the largest milk producer in the world, India's per capita availability of milk is one of the lowest in the world, although it is high by developing country standards. The per capita availability of milk, which declined during the 1950s and 1960s (from 124 gm per day in 1950-51 to 121 gm in 1973-74) expanded substantially during the 1980s and 1990s and reached about 226 gm per day in 2001-02 (Figure 1). The per capita consumption of milk and milk products in India is among the highest in Asia. However, it is still below the world average of 285 gm per day and the minimum nutritional requirement of 280 gm per day as recommended by the Indian Council of Medical Research (ICMR).

Several factors have contributed to the increased milk production in the country. First, milk and dairy products have cultural significance in the Indian diet. A large portion of the population is lacto-vegetarian, so milk and dairy products are an important source of protein in the diet. The demand for milk and dairy products is income elastic, and growth in per capita income is expected to increase demand for milk and milk products. Empirical evidence has shown that the composition of an average Indian's food basket is gradually shifting toward value-added products, including milk and dairy products. The proportion of income spent on milk and milk products increased from 11.7 % in rural areas and 14.7 % in urban areas in 1970-71 to 21.6 and 16.7 % in 1999-00, respectively (Figure 1). Other socio-economic and demographic factors, such as urbanization and changing food habits and lifestyles, have also reinforced growth in demand for dairy products. On the supply side, technological progress in the production and processing sectors, institutional factors, and infrastructure play an equally important role. The linking of rural small producers with urban consumers through producers' cooperatives was a true institutional innovation in the Indian dairy sector.

Given its high income elasticity, the demand for milk and dairy products is expected to grow rapidly. A study conducted by **Saxena (2000)** using National Sample Survey (NSS) data for 1993-94 showed that income elasticity of demand for milk and milk products is higher (1.96 national level) in rural areas (ranging from 1.24 in Punjab to 2.92 in Orissa) than in urban areas (ranging from 0.99 in Punjab to 1.78 in Bihar). The northern region in general and Gujarat in the western region show low income elasticity of demand for milk and milk products. The high values of income elasticity for different states in the eastern region-varying from 2.5 to 2.9 in rural areas and from 1.5 to 1.8 in urban areas-show a very strong preference for milk and milk products with an increase in income. Further increases in per capita income and changing consumption patterns would lead to acceleration in demand for milk and other livestock products in India and thus, would give boost to this sector. **Radhakrishna and Ravi (1994), Gandhi, Mani (1995), Kumar (1998), Dastagiri (2001)**, and others have estimated demand and income elasticity of demand for milk and milk products, and shows similar trends (Figure 2).

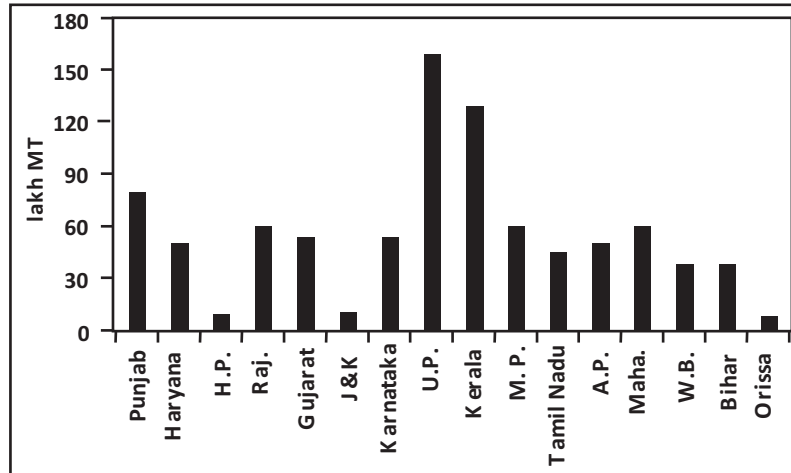
Delgado et al. (2001) have estimated per capita consumption of milk products in developing countries to be about one-third that of developed countries in 2020; however, in aggregate terms, 60 percent of world milk consumption will take place in developing countries, which is a major shift from the early 1990s, when the developed countries consumed 59 percent of world milk production. The projected growth rate for milk is expected to be around 4.3 percent during 1993-2020. **Kumar (1998)** projected demand for milk at 142.7 million tons by 2020 at 5 percent growth in GDP (182.8 million tons at 7 percent growth in GDP). The estimates given by **Saxena (2000)** are different than other estimates and projects demand for milk to reach its peak at 85.7 million tons in 2007-08 and decline thereafter. **Saxena** argued that the domestic market may expand if a rise in per capita income is more in favor of lower income groups and regions, as the income elasticity of demand for such groups and regions (eastern) is much higher. The wide variations in demand estimates are mainly due to different assumptions of elasticity, population projections, and other parameters.

REGIONAL PATTERNS OF GROWTH

There are large interregional and interstate variations in milk production as well as in per capita availability in India. About two-thirds of national milk production comes from Uttar Pradesh, Punjab, Rajasthan, Madhya Pradesh, Maharashtra, Gujarat, Andhra Pradesh, and Haryana. However, there have been some shifts in milk production shares of different states. In 2001-02, Uttar Pradesh was the largest milk producer in the country with about 16.5 million tons of milk, followed by Punjab (8.4 million tons), Rajasthan (6.3 million tons), Madhya Pradesh (6.1 million tons), Maharashtra (6 million tons), and Gujarat (5.6 million tons). During 1982-83 triennium ending (TE), the top five milk-producing states were Uttar Pradesh (18.5%), Punjab (10.1%), Rajasthan (9.8%), Gujarat (6.8%), and Haryana (6.6%). During TE 2001-02, Uttar Pradesh (19.5%), Punjab (9.9%), Rajasthan (7.5%), Maharashtra (7.3%), Madhya Pradesh (7.2%), and Gujarat (6.6%) were the largest producers. The share of Andhra Pradesh, Gujarat, Karnataka, Kerala, Maharashtra, Punjab, Uttar Pradesh, and Orissa increased between 1991 and 1999-01, while the share of Bihar, Haryana, Madhya Pradesh, Rajasthan, Tamil Nadu, and West Bengal declined. Major milk-producing regions in the country have good resource endowment and infrastructure. The eastern region is lagging behind in terms of dairy development. The government has initiated various dairy development programs, especially for the eastern and hilly regions.

There are also wide variations in per capita availability of milk in the country. The average per capita availability is lowest in the eastern region and highest in the northern region (Figure 2). The average per capita availability of milk

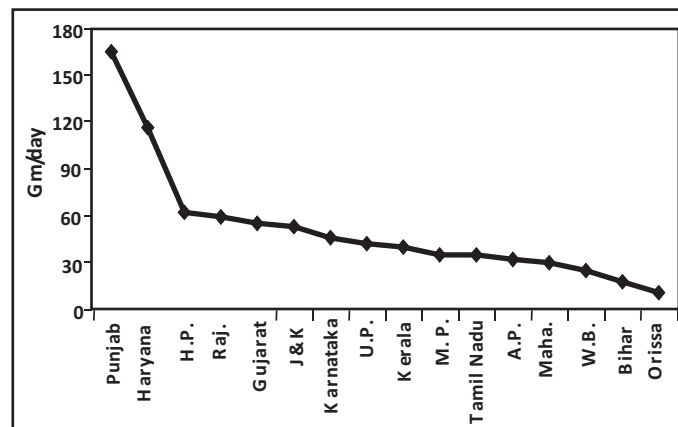
Figure 3 : Total Milk Production In Major States In India



Source: GOI, 2008

during 2000-01 was highest in Punjab (997 gm/day), followed by Haryana (645 gm), Himachal Pradesh (354 gm), Rajasthan (300 gm), and Gujarat (296 gram). Only 10 states had higher than the national average per capita availability of milk (220 gram/day). The per capita availability is low in the eastern and northeastern states. The average per capita consumption of milk and dairy products is lower in rural areas than in urban areas, even though milk is produced in rural areas.

Figure 4 : Per Capita Availability Of Milk In Major States In India



Source: GOI, 2008

CONCLUSION

The dairy industry will have to upgrade itself to the international level. The international dairy industry is, however, highly protected through domestic support and export subsidies and does not provide an easy market access. A number of trade barriers are applied to deprive the developing countries from sharing the markets of developed nations. The Indian Dairy sector, however, could not make significant inroads in the global market due to several impediments. The quality of milk is a matter of concern, which is now being addressed by all concerned. Most of the Dairy units are seriously looking into the improvement of sanitary and hygienic conditions by adopting ISO certification as well as HACCP programmes. The Sanitary and Phyto-Sanitary (SPS) measures are becoming mandatory for export and serious efforts have to be made to achieve the international standards of quality.

BIBLIOGRAPHY

1. Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, GoI.
2. <http://www.mdcdatum.org.uk/MilkSupply/euproduction.html>

- 3 <http://www.oecd.org>.
4. International Dairy Federation, Bulletin 423/2007.
5. Webb, B.H., A.H. Johnson and J.A. Alford. 1974. Fundamentals of Dairy Chemistry. Second Ed. AVI Publishing Co., Westport, CT., Chap. 1
6. OECD Agricultural Outlook Tables, 1970-2014, <http://www.oecd.org/searchResult/html>
7. <http://www.mdcdatum.org.uk/MilkSupply/euproduction.html>.
8. Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, GOI.
9. GOI, Basic Animal Husbandry Statistics 2002.
10. Dastagiri, M.B (2001) "Demand for livestock products in India: Current status and projections to 2020", Agricultural Economics Research Review (Conference Proceedings). Delhi: Agricultural economics Research Association (India).
11. Delgado, C, Rosegrant M and Meijer, S (2001) "Livestock to 2020: The revolution continues", Paper presented at the Annual Meetings of the International Agricultural Trade Research Consortium (IATRC), Auckland, New Zealand, January 18-19, 2001.
12. Gandhi, V.P. and Mani, G (1995) "Are livestock products rising in importance? A study of the growth and behaviour of their consumption in India", *Indian Journal of Agricultural Economics*, 50 (3) (July-September): 283-93.
13. Kumar, P (1998) "Food demand and supply projections for India", Agricultural Economics policy Paper 98-2001. New Delhi: Indian Agricultural Research Institute.
14. Radhakrishna, R and Ravi, C (1994) "Food demand in India", Hyderabad, India: Centre for Economic and Social Studies. Mimeo.
15. Saxena, Rakesh (2000) "Dynamics of demand for milk in this millennium", Paper presented at the XXX Dairy Industry Conference on Paradigm Shift in Dairying - Its Impact on the Indian Dairy Industry, December 8-9, 2000. Calcutta: Indian Dairy association (East Zone): 32-47.

(Contd. From Page 35)

ANNEXURE : Exhibit 1: Major Grocery Retailers in India

Retailer	Retail Sales (INR Crore) (2006-2007)	Retail Space (Sq Ft) (2006-2007)	No of outlets (2006-2007)
	(2006-2007)	(2006-2007)	(2006-2007)
Nilgiris	110	200	44
Spinach	90	154	60
Subhiksha	334	Data Not Available	315
Taj	19	29	4
Fab Mall (Trinethra)	277.99	526	198
Trumart	Data Not Available	168	42
Food Bazaar	Data Not Available	480	45
Spencer's	Data Not Available	181	68
SPAR	Data Not Available	27	1
Nature's Bazaar	Data Not Available	Data Not Available	3
Namdhari's Fresh	Data Not Available	20	13
Big Apple	Data Not Available	Data Not Available	3
Reliance Fresh	Data Not Available	Data Not Available	22
C3	14.4	22	6
Monday to Sunday	Data Not Available	13	2
Foodworld	Data Not Available	71	31
Fresh@ (Heritage Foods)	Data Not Available	4	1
Arambagh Food Mart	26	13	24

(Source: Adapted from , R Rajmohan (2007), India Retail Report, 2007, Images Multimedia Pvt. Ltd.)