8.1. Outline of the Study

India has achieved tremendous growth in milk production during the last three decades. The milk production was about 22 million tonnes during 1970-71 increased to 88 million tonnes in 2002-03 with the compound growth rate of about 4.7 per cent per annum. India now ranks first in milk production in the world. The milk sector contributes a significant share of agricultural and livestock GDP. In fact, milk is the largest farm commodity in terms of value contribution to the gross national product. During the initial years of development, the government protected the dairy sector through various internal and external regulations. The dairy industry was reserved for cooperatives and protected against competition till nineties. The milk procurement, processing and distribution were largely regulated through licensing system.

However, two major happenings in the nineties, i.e. economic reforms at the domestic level and emergence of trade rules in the form of GATT/WTO at the global level reduced the interventionist role of government in this sector. The available literatures on Indian dairy sector largely focus on the farm management aspect of milk production. Very few studies addressed partially the issue of economic efficiency of Indian dairy sector under the context of trade liberalization. However, it is of crucial importance to study the level of protection that was accorded to dairy sector since 1970s not only for the development of this sector, but also its implications for the rest of the economy in terms of the allocation of resources. But, the incentive structure per se does
not give any policy directions for resource reallocation, unless comparative advantage of products under consideration is known, which in turn depends on the factor productivity or technical efficiency of the activity. Thus, to address all these issues, the present study aims at the following specific objectives.

1. To study the structure and growth of dairy industry
2. To analyse the domestic and trade policies of India with special reference to dairy sector
3. To compute the protection indicators of major dairy products
4. To measure the comparative advantage of major dairy products
5. To examine the relationship between trade liberalization and productivity growth in Indian dairy industry

Based on the objectives of the study and review of literature, the following hypotheses have been formulated for empirical verifications.

1. That there are no structural changes in dairy industry overtime
2. That despite trade liberalization and WTO agreements, the Indian dairy industry is protected against the influences of international trade
3. That India has revealed comparative advantage in the export of dairy products
4. That there is technological change in Indian dairy products industries and they are technically efficient
5. That there is a positive relationship between trade liberalization and productivity growth in Indian dairy industry

Due to non-availability of reliable data reasonably for long period of time, this study analyzes the incentive structure of Indian dairy industry for the recent periods. The study is organized under the simple political market framework. The tools used to analyze the issues of the
study are derived from the standard neo-classical theories. Specifically, the protection indicators like Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC) and Producer and Consumer Support Estimates have been used to study the incentive structure of milk and milk products for the period 1990-91 to 2002-03. The comparative advantage of dairy products has been measured by applying the theory of Revealed Comparative Advantage. The non-parametric approaches of translog index and Data Envelopment Analysis (DEA) have been used to examine productivity growth and technical efficiency of dairy products industry, respectively, under different policy regimes.

8.2. Summary of Findings

**Structural Changes**

The structural and growth analysis of dairy industry are presented in Chapter II. The structural changes in dairy industry are studied under two parts namely, Pre-Operation Flood Phase and Post-Operation Flood Phase using appropriate indicators. Based on the structural analysis of Indian dairy sector, testable hypotheses about the incentive structure of milk and milk products have been proposed to give guidance for subsequent analysis.

The organized dairy development in India began during 1970s with the launching of “Operation Flood” programme. India has achieved quantum jump in milk production over the period of time with the compound growth rate of about 5 per cent per annum during 1970-71 to 2002-03. The share of value of milk output in total agricultural output showed increasing trend overtime. The milk group dominates the total value of output from livestock accounting for more than 65 per
cent. The dairy sector contributed around 6 per cent to total GDP till nineties and it declined marginally thereafter.

India possesses the largest livestock population in the world. But, the composition of livestock population has not undergone much change over time. India's livestock population is dominated by cattle followed by goats and buffaloes. However, the percentage of cattle population in total livestock population has declined from 52.36 in 1961 to 40.97 in 1997. But, buffalo population has increased steadily across different inter-census periods in India. As a result of introduction of crossbred technology, there is a little change in the dynamics of female cattle population. The cross bred female cattle population comprised 4.98 per cent of total female cattle during 1982 increased to 14.35 per cent during 1997. Even after three decades of introduction of cross breeding technology in India, the proportion of cross bred milch cattle remained low as compared to indigenous cattle. This raises a serious question with respect to the effectiveness of crossbreeding technology to upgrade indigenous cows. Crossbreeding of non-descript buffaloes with high yielding native breeds did not receive much attention as crossbreeding of indigenous cows. However, buffaloes continue to dominate the milk production scene in the country contributing more than 50 per cent of total milk output. The average milk yield of the milch animals has not improved significantly overtime.

Unlike in developed countries, the preference for liquid milk consumption to value added dairy products is increasing over time in India. During 1951, about 39.3 per cent of milk was consumed as milk beverages such as tea, coffee etc. which increased to 45.2 per cent, 46 per cent and 45.7 per cent during 1961, 1985 and 1995, respectively. A
little quantity of total milk produced is converted into western type milk products like skim milk powder (SMP), whole milk powder (WMP), butter, baby food, cheese and curd. However, there existed differences in the consumption of milk and milk products across urban and rural areas, with increasing trend in urban areas while declining trend in rural areas. Despite the over all increasing demand, the growth in wholesale prices of liquid milk relative to its manufactured products was low during the period 1980-81 to 2001-02. This is due to the deliberate decision of the government to keep the liquid milk price at low level to appease the vast urban consumers.

Though emphasis was given to develop milk processing facilities since the early stages of dairy development, yet the processing facilities have not grown as much as the milk production. Only about 13 per cent of total milk produced is handled in organized sector, which includes cooperative, government and private plants, while the rest is handled in traditional sector. With the opening of dairy industry as part of economic reforms of nineties, the number of dairy plants increased substantially in recent periods. However, it is shocking to observe that size of employment in dairy products factories is very small and is showing declining trend overtime. Though bulk of marketed surplus of milk is handled in traditional sector, little information is available to describe the role of this sector. However, the analysis of data pertaining to cooperative sector showed that the growth in cooperative milk procurement and marketing was negative in some states during recent times. This decline might have been offset by the emerging private dairies in those states. The structural and growth analysis of dairy sector revealed that the potential beneficiaries of distortionary price policy are the urban consumers. Thus, based on the structural analysis, a set of testable hypotheses has been formulated for empirical
verification. It has been hypothesized that dairy producers at the farm level are taxed (receive disincentives) and that manufactured dairy products (at the processing level) are protected or receive incentives. These propositions are very well within the predictions of the theory that developing countries tax their farmers while protecting the manufacturing sector from import competition.

**Dairy Trade Policies**

The dairy trade policies of India are presented in Chapter III. The trade policies are analyzed broadly under two sections viz., domestic regulations and Export-Import regulations. The impact of trade policies on the export and import performance of dairy products are analyzed for the period 1990-91 to 2002-03. Besides domestic reforms, WTO agreements have directly influenced to further the trade liberalization of dairy sector. The significance of multilateral agreements on the growth of global dairy sector in general and its impact on Indian dairy industry in particular are also critically analyzed in this chapter. This chapter also discusses an overview of global dairy industry and significance of India as leading milk producer in the global scenario.

The government protects or disprotects a particular sector through various policy instruments. These policy instruments are broadly grouped under trade policies. Since the beginning of organized dairy development, the objective of dairy policy was to attain self-sufficiency in milk production. It was realized that continued dependence on imports would not be in the interest of development of this sector. For the first time in 1957, the commercial import of milk powder was completely prohibited following an agreement with USA to import milk powder based on “rupee trade” arrangement under PL (Public Law) 480. Later, the import of dairy commodities as food aid
from European Economic Community (EEC) was canalized through Indian Dairy Corporation (IDC). The imported skim milk powder and butter oil were reconstituted into liquid milk and sold at the price prevailing in the domestic market so as not to affect the nascent dairy industry. Realizing that the cooperatives are the best path for dairy development in India, the dairy industry was reserved for cooperatives and protected till 1990s from import competition. The commercial import of dairy products were banned/ prohibited / restricted as consumer goods.

Consequent to economic reforms introduced in 1991 the import control in general, on most of items was relaxed. A regime change from quantitative restrictions to tariff based system was introduced. The dairy industry was delicensed during 1991 and opened for private participation. All the milk products except malted foods were covered in the category of industries for which foreign equity capital participation upto 51 per cent was automatically allowed. Ice-cream industry, which was reserved for manufacturing in the small-scale sector, was later dereserved. Further, all the dairy products were decanalized. However, the government soon brought back the licensing system in the form of Milk and Milk Products Order (MMPO), 1992 under the provisions of Essential Commodity Act, 1955 for the orderly development of this sector. The order was amended from time to time to make the sector more liberal and facilitate faster growth. Despite relaxation in government regulation and control of dairy industry through central legislations, there exist some controls on the movement of liquid milk and manufacture of milk products at the state level.

Besides economic reforms, the WTO Agreements on Agriculture have also had impact on the traditional dairy policies. Tariffs on most of
milk products were brought down considerably in recent periods. Initially skim milk powder and whole milk powder could be imported with zero duties. However, the surge in import of milk products especially skim milk powder in the subsequent years, forced the government to renegotiate at WTO during 2000-01 and fixed Tariff Rate Quota (TRQ) for SMP and WMP. The tariff on imports upto 10,000 MT of SMP and WMP is 15 per cent and outside TRQ, imports will attract 60 per cent duty. Further, the Quantitative Restrictions (QRs) on import of all products were removed in April 2001. However, fearing surge in import of dairy products consequent to removal of QRs, Ministry of Agriculture issued a notification in July 2001 that the Central Government can restrict the import of livestock products including milk and milk products under the amended Livestock Importation Act, 1898 on the grounds of phyto-sanitary permission. Thus, despite gradual reduction in import duties, the non-tariff barriers cropped up in one or the other forms in the way of effective trade liberalization.

These policy changes affected the export-import performance of dairy products. As against the generally held notion that import liberalization will affect the Indian dairy industry adversely, the openness measures defined as the ratio of imports as percentage of livestock GDP, consumption and agricultural imports showed that liberalization did not pose any threat to Indian dairy industry. That is, the import penetration of dairy products was very low during the period 1990-91 to 2002-03. However, in general, the international trade in dairy products increased overtime, but with wide fluctuation. These fluctuations can be attributed to constant changes in government policies on the export and import of dairy products. During early nineties, the import of dairy products exceeded over exports showing

244
negative trade balances. However, during 2000-01 to 2002-03, exports by and large, started picking up indicating positive trade balances.

At the global level, dairy sector is one of the highly protected and supported of all the agricultural activities. Many countries restricted the import of dairy products by maintaining high tariff and non-tariff barriers and simultaneously supported exports through huge export subsidies, thus depressing the world price for long. However, the dairy sector received a special attention in the international trade negotiations in the form of plurilateral agreement even before the comprehensive Agreement on Agriculture came into effect. With the establishment of WTO in 1995, the Agreement on Agriculture attempted to regulate the international dairy trade by removing trade distortionist policies of member countries followed in the form of domestic support, restrictions on market access, export subsidies etc. But, in actuality developed countries found ways to circumvent the rules of WTO, thereby affecting the prices in the international market. The restricted imports through high tariffs coupled with surplus production resulting from domestic support paved the way for providing huge amount of export subsidies, which continued to depress the world market price.

As far as the implications of trade reforms and WTO agreements for Indian dairy industry is concerned, they provide both opportunities and challenges for India. As for opportunities, India can increase its share in the world dairy market by realizing its milk production potential. But, the level of distortion in the world market is unlikely to vanish in the immediate future. Thus, the better option would be to cater the vast domestic market. As far as challenges for Indian dairy industry are concerned, the level of efficiency of production, processing and other related operations assumes importance. Often, the
distortionary price policy of a country to protect different interest groups lead to misallocation of resources resulting inefficiency in performing various activities. The Chapter V, in fact discusses the Indian price policy effects, measured through different protection indicators, on production and trade of milk and milk products.

Protection of Milk and Milk Products
Chapter IV and V sketches the comprehensive work on protection/incentive structure of milk and milk products of India. The critical view of the analyses of Chapter II and III broadly guides the interpretation of results of protection indicators. The Chapter IV begins with theoretical framework to compute the protection. The detailed account on selection of variables and data adjustments has also been given in this chapter. The detailed data on prices, technical coefficients, freight rates, production and processing cost etc. have been made use to compute the protection indicators. The nominal protection coefficients (NPCs) and effective protection coefficients (EPCs) have been estimated for SMP, WMP and butter. Producer Support Estimates (PSEs) and Consumer Support Estimates (CSEs) have been worked out for milk. These protection indicators were worked out for four states viz., Punjab, Gujarat, Orissa and Kerala. The empirical analysis of dairy protectionism is presented in Chapter V. It starts with structure and behaviour of international and domestic prices of skim milk powder, whole milk powder and butter. The trend in producer price and consumer price of milk has been studied to gauge the efficiency of various operations that take place from procurement to distribution. The cost structure of milk production and processing of milk products have also been studied to identify the inputs that tradable. An attempt has also been made to measure dairy input subsidies, which has been used in the calculation of producer support estimates.
The international prices of skim milk powder and whole milk powder showed a regular pattern of downward and upward movement during the period 1991 to 2003. The fluctuation in the price of WMP was much sharper than SMP. The export supplies from major exporting countries like New Zealand and Australia and import demand of major importing countries like Brazil, Russian Federation, OPEC countries determine the movement of international dairy prices. The export subsidies given by EU and USA are also responsible for the fluctuation of prices to certain extent. The international butter prices showed both increasing and decreasing trend during early nineties. After 1995, the prices started falling continuously with some recoveries during 1998 and 2003.

The analysis of domestic prices of milk and milk products revealed the varying level of efficiency of different operations from procurement to distribution. In Gujarat, both the producer price and the consumer price showed upward trend during the period 1990-91 to 2002-03. However, the producer price fluctuated within the narrow band of Rs.11 to Rs.12 during 1999-00 to 2002-03. The difference between the producer and consumer price ranged between 14 paise to Rs.2.26 during the entire period. The gap between these two prices showed increasing trends from late nineties. The producer's share in consumer's rupee ranged from 77 per cent to 95 per cent during the study period in Gujarat. The consumer price of toned milk in Punjab showed steady increase after 1993-94. The producer price also increased moderately till 1999-00, but it started declining slightly afterwards. During early nineties the share of producer's rupee in consumers’ was around 90 per cent, declined drastically during the rest of the period and hovered around 75 percent. In Kerala, the consumer price, by and large, increased steadily till 1997-98 and thereafter
remained constant. However, the producer price declined slightly during late nineties and early 2000s. Further, the producer's share in consumer rupee was around 73 per cent during the periods under study. The producer price of milk in Orissa showed increasing trend till 2000-01 and thereafter declined slightly. The consume price, by and large, increased steadily overtime. The producer share was around 70 per cent only.

The dairy products are priced based on cost of production and a limited margin is added to it. Unlike liquid milk, there is no restriction or external influence on pricing of milk products. In fact, a margin is fixed on products such that it recovers the part of costs incurred in manufacturing of liquid milk. Thus, there exists some degree of cross subsidization in milk pricing. The prices of dairy products varied from state to state depending upon the processing costs during the period 1990-91 to 2002-03.

The analysis of input cost structure of milk production at different regions of the country showed that feed and fodder accounted for the largest cost share followed by human labour and health care expenditure. Similarly, the analysis of processing cost of milk products revealed that raw materials, mostly raw milk, accounted for about 83 per cent of total cost in case of skim milk powder production, and 73 and 85 per cent for butter and ghee production, respectively.

There are arguments that virtually no subsidies are given to dairy sector. Transfers to this sector are, generally viewed as investment not meant for commercial gains. However, quantification of dairy input subsidies showed that the amount of subsidies given to dairy production is substantial. In fact, the total subsidies increased from Rs.
189.71 crores in 1980-81 to Rs. 571.84 crores in 1990-91 and to Rs. 1231.47 crores during 2001-02. The compound annual growth in subsidies was much higher during eighties than nineties. Amongst input subsidies, the rate of growth and the magnitude of dairy developmental subsidies were high during eighties and nineties, respectively. The milch animals subsidies, increased from Rs. 49.69 crores in 1980-81 to Rs. 356.99 crores in 2001-02, while the fodder and feed subsidies increased from Rs. 4.11 crores to Rs. 31.45 crores during the same period.

The estimates of protection indicators reveal that dairy products receive positive protection in India. Except during 2001-02, the weighted average values of Nominal Protection Coefficients (NPCs) of skim milk powder are greater than one under both importable and exportable scenario. The trend showed that, the NPCs declined during early nineties, then started increasing, and finally, by and large, declined during late nineties and 2000s. However, the statewise analysis presents a mixed picture about level of protection. SMP received positive protection in Punjab, Kerala and Orissa during 1990-91 to 2002-03. But, in Gujarat positive protection was visible during 1990-91 and 1991-92 and thereafter, the producers received the reverse protection except for a few years during late nineties. The NPC for the entire period in Gujarat was below unity under importable hypothesis. Further, under exportable scenario also, Gujarat emerged export competitive during most of the periods under study. In general, the results of EPCs of SMP follow closely the values of NPCs both under the importable and the exportable hypotheses. The values of EPCs revealed that except for a few years in Gujarat and Orissa, the domestic producer received higher returns to their inputs under importable hypothesis than what they would have got under free trade scenario.
The similar picture emerged from the export promotion scenario also. The average EPC value of SMP was the highest in Punjab followed by Kerala and Orissa. Over all, the weighted average EPCs showed declining trend during early nineties, increased thereafter and finally it had fallen during late nineties and 2000s.

The nominal protection coefficients of whole milk powder were greater than unity under importable hypothesis in all the states during the period 1990-91 to 2002-03. The average NPC value was the highest in Gujarat with 2.05 followed by Kerala and Punjab with 1.88 and 1.87, respectively. Under the export promotion scenario also, the producers of WMP are positively protected against influences of the international trade. That is, the domestic price of WMP was maintained at much higher level than export parity price during the period 1990-91 to 2002-03. EPCs of WMP also followed the same pattern as NPCs because of low share of tradable inputs in the value of output. The EPCs values both under importable and exportable hypothesis were higher than their corresponding NPCs values.

The results of NPCs of butter showed that the producers of butter receive positive protection in all the selected states during the periods under study. The positive protection prevails under both the importable and exportable hypotheses. It was surprising to notice that unlike SMP and WMP, the overall NPC was much higher during late nineties than the early and mid nineties. The domestic price of butter was very high in Punjab compared to the international price resulting in higher NPC of 2.33 under import substitution scenario. The EPCs of butter also showed the similar pattern as the NPCs during the periods under study. The EPCs values under both the hypotheses were much higher than
their corresponding NPCs. The overall degree of protection was very high during late nineties.

The results of producer support estimates should be different from NPCs and EPCs. The PSEs shows the extent of government intervention at the farm level, while the NPCs and EPCs show the degree of protection at farm-processing-marketing levels combined. That is, the former reveals the protection level of milk only, while the latter on dairy products. The total support to milk producers measured by the percentage PSE declined over the period of time. The PSE was around 41 per cent during 1986, by and large, declined drastically in the subsequent years. The percentage PSE of milk was negative during nineties and 2000s. In monetary terms, the PSE for milk was Rs. 6195 crores in 1986 decreased to Rs. 1492 crores in 1988 and by and large, it became negative, during rest of the years. The market price support (MPS) accounted for the largest share of PSE. It was also evident from the analysis that the per cent budgetary payments to value of milk output was around 3 per cent from 1986 to 1989, declined to about 2 per cent from 1990 to 2003. The results of NPCs, EPCs and PSEs verify the hypotheses that dairy producer at the farm level are taxed (receive disincentives) and that manufactured dairy products are protected (receive incentives).

**Revealed Comparative Advantage**

The comparative advantage of Indian dairy products like milk powder, butter and cheese and curd relative to SAARC region and world market is presented in Chapter VI. The chapter starts with theoretical review on measurement of comparative advantage. Balassa’s Revealed Comparative Advantage (RCA) and its modified version of Revealed Symmetric Comparative Advantage (RSCA) have been used to measure
the comparative advantage of Indian dairy products for the period 1990 to 2003.

The results of Revealed Comparative Advantage (RCA) show that India is efficient in exporting milk powder and butter in the SAARC market. The revealed comparative advantage appears to be relatively stronger in milk powder than butter over the period of time. Except 1990 and 1992, the value of RCA for milk powder was greater than one. Compared to early nineties, the comparative advantage gained strength during late nineties and then started weakening during recent periods. India had comparative disadvantage in butter during 1990 and 1991 and thereafter it disappeared, but again lost its revealed comparative advantage during 1997 and 2001. The value of RCA for cheese and curd was less than one till 2000. However, India gained revealed comparative advantage in the export of cheese and curd in market of SAARC countries from the year 2001 onwards. The Revealed Symmetric Comparative Advantage (RSCA) index also showed the same pattern in the distribution of comparative advantage of dairy products as RCA.

However, the pattern of revealed comparative advantage of India’s dairy products in the world market was completely different from the pattern observed in the South Asian market. India has relatively global revealed comparative disadvantage in all the three dairy products under considerations. The value of RCA was less than one for milk powder, butter and cheese and curd during the period 1990 to 2003. However, India’s revealed comparative disadvantage of milk powder and butter in the world market is weakening during the recent periods.

The results of estimated regression model examining the changing pattern of revealed comparative advantage of dairy products showed
that there was a trade off between milk production and rice production. That is, the increase in rice production reduces the value of revealed comparative advantage of milk products. Meat production also appears to be affecting the comparative advantage of dairy products. However, the coefficient of meat production was not statistically significant. The model results also indicated that egg production and wheat production do not affect the RCA of India's dairy products.

**Trade Liberalization and Productivity Growth**

Chapter VII examines the productivity growth of dairy products industry and its linkage with trade liberalization. Due to non-availability of detailed time series data on various milk products industry, ASI (Annual Survey of India) data at 3-digit level has been used. Translog method is used to calculate total factor productivity growth at all India level for the period 1981-82 to 2001-02. An attempt has also been made to calculate technical efficiency of various dairy products industries at 5-digit level for the period 1999-2000.

The estimated Total Factor Productivity (TFP) results showed occurrence of technological change in dairy products industry during 1981-82 to 2001-02. The TFP growth during 1981-82 to 1989-90 was positive and it was 0.13 per cent. But, surprisingly it had declined to 0.02 per cent during 1990-91 to 2001-02, which coincided with economic reform period. The output growth also showed marked decline in nineties compared to eighties. In fact, the output growth during 1981-82 to 1989-90 was 0.18 per cent, which declined to 0.05 per cent during 1990-91 to 2001-02. During the entire period, output growth was 0.11 per cent while the input growth was 0.04 per cent resulting in the TFP growth of 0.07 per cent.
The technical efficiency estimated through Data Envelopment Analysis for the period 1999-00, was less than one for most of the dairy product industries under considerations. The average technical efficiency based on CRS model for the dairy products industry as a whole was found to be 0.54. The average pure technical efficiency and scale efficiency worked out to be 0.70 and 0.77, respectively. Further, slacks are found in all the inputs across dairy products manufacturing except for labour input in the milk powder industry and ice cream and kulfi industry.

The results of estimated regression equation linking total factor productivity growth and trade liberalization revealed a positive relationship between TFP growth and net value added growth. The elasticity of TFP growth with respect to net value added is found to be 0.11. As expected, the coefficient of effective protection was negative and significant at 5 per cent level. The coefficient of the tariff variable was also found to be negative and significant at five per cent level. Further, the coefficient of the Real Effective Exchange Rate (REER) variable was positive and significant at one per cent level.

8.3. General Conclusions
Based on the above-presented summary results of the study, the following general conclusions have been drawn.

1. Though India achieved phenomenal growth in milk production, the structure of dairy industry in terms of dynamics of livestock population, employment, processing, marketing, consumption and value added dairy production, has not undergone much change over the period of time.
2. The structural analysis of dairy industry showed that the potential beneficiaries of distortionary price policy are the consumers, while the provider of such policy is the government.

3. Despite the general sectoral liberalization, the government interventions continue to exist in the form of both the domestic regulations and export-import regulations.

4. The openness measures, i.e. the ratios of dairy imports to livestock GDP, consumption and total agricultural imports indicate that import liberalization did not pose any threat to Indian dairy industry.

5. Though international trade in Indian dairy products increased overtime, but the trade performance was marked with large fluctuations due to constant changes in the policies of the government.

6. The continued pursuit of trade distortionist policies by the developed countries indicates that WTO agreements achieved little in regulating international dairy market.

7. The values of protection indicators (NPCs and EPCs) of skim milk powder under both importable and exportable hypotheses were greater than unity indicating that producers of SMP in India are receiving higher incentives than they would have got without interventions. Among states, Gujarat emerged as efficient producer of SMP both under importable and exportable scenario.

8. The protection indicators of whole milk powder under both importable and exportable scenario were greater than one. It shows that the producers of WMP received positive protection from the influences of world prices during the period 1990-91 to 2002-03.

9. The NPCs and EPCs values of butter showed that butter is neither an efficient import substitute nor export competitive. The
producers have to be very efficient to compete in the international market, through reduction in cost of processing and marketing. Export subsidies are to be provided, if the government intends to export butter.

10. The percent PSE for milk was negative during most of the periods under study, showing that the dairy farmers in India receive disincentives. That is, there is a gross transfer from dairy farmers to consumers of milk. It also implies that the consumers do not pay the actual cost of production.

11. India has revealed comparative advantage of milk powder and butter in the South Asian market during the period 1990 to 2003. But at the global level, India has stable comparative disadvantage.

12. The Indian milk producers have greater opportunity cost associated with their decision to produce milk, as increase in the production of rice found to reduce the value of symmetric revealed comparative advantage of milk products.

13. Low value of TFP growth during the entire period of 1981-82 to 2001-02 and their sub-periods indicate that technological progress in dairy products industry is very slow. Further, the dairy products industries are found to be technically inefficient.

14. The relation between the productivity growth and effective protection is found to be negatively related implying that decline in protection would increase the productivity growth in Indian dairy products industry.
8.4. Policy Recommendations

1. Concerted efforts should be made to integrate the small farm dairy producers with both the input and output markets, as the milk production activity is socially profitable and bound to impact on the millions of rural livelihoods.

2. Efficient infrastructure facilities should be developed to channel the milk from surplus region to deficit areas. This may even out the regional differences in demand and supply of milk and would ensure reasonable price to the farmers and consumers during both flush and lean seasons.

3. From the allocative efficiency point of view, the production of milk products except SMP in some states is not socially profitable. However, given the level of support prevailing in the developed countries, the government should provide various incentives to develop the milk processing industries.

4. Efforts should also be made to enhance the productivity growth of dairy processing industries in the states like Gujarat through adoption of new technology, capital etc.

5. Concerted efforts should be made to improve the genetic potential of milch animals by crossbreeding with locally adaptable breeds. Upgrading of non-descript buffaloes should get as much attention as dairy cattle, as the upgraded buffaloes can perform well under different climatic conditions.

6. The public provisioning of veterinary inputs delivery system should be strengthened by invigorating the extension machineries, so that the needy farmers could benefit from it.

7. The government should undertake systematic collection and record of data pertaining to milk production, procurement, marketing and processing, both at the organized and traditional sector periodically.
8. India should negotiate strongly in the WTO to bring down the level of support given by the developed countries, as it causes the downward pressure on the world market price.