Final Report

INDIA'S DAIRY SECTOR IN THE EMERGING TRADE ORDER

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Preface

The Ministerial Conference of the WTO member countries at Cancun failed to arrive at any joint declaration. Some of the most contentious issues, which jeopardized the concrete output of the conference, were farm subsidy and high tariff for primary commodities. Some developed countries subsidize their farmers to the extent that it distorts world trade. It is alleged that the prohibitive tariff wall has been erected by the developing countries. The developed countries especially the European Union (EU) and United States (US) have been arguing with the WTO member countries for reduction of import tariffs as per the WTO Agreements.

Developing countries like India argue that a high import tariff is justified as long as high farm subsidy- explicit or implicit exists. It has been observed that the world price of agricultural commodities dips abnormally even in the WTO implementation period; in this situation allowing imports at low tariff regime will depress the prices of agricultural commodities in the importing countries. This decrease in domestic prices would have large ramifications for the sector and also for the country.

Milk and milk products are among the agricultural commodities, that attract substantial subsidies in the developed countries. In India, however this is associated with the fate of millions of rural poor; milk and milk products therefore can provide an apt example for assessing implications of import liberalization for a developing country. This assessment also requires a brief performance review of the Indian as also the world dairy market; finally, it chalks out strategies for India's dairy sector in a globalising world.

This is a study for the Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. The study would probably help policy makers and would also encourage researchers to undertake similar studies for other commodities since the implications of trade liberalization varies across the commodities. The present study involves the use of simple economic tools to achieve its objectives; the study can therefore, be used by persons across the professional disciplines.

Brajesh Jha

INDIA'S DAIRY SECTOR IN THE EMERGING TRADE ORDER

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Abstract

The growth of dairy sector during the last three decades has been impressive. A set of government policy which created suitable price environment for domestic milk production, is believed to be the key behind this impressive growth; the price-based supports are however untenable in the new trade order. In the spate of trade liberalization India has also replaced non-tariff-barriers in imports of milk products with moderate tariff and tariff rate quotas. There is now pressure for further reduction of import tariff, while distortions in world dairy market continue. With trade liberalization decreasing trend in real price of milk is already evident, this may have different implications for major constituents of the dairy sector. Implications would also vary across regions since a disaggregate analysis of the dairy sector presents considerable disparity in its growth. Present study by adopting the economic surplus approach assesses effect of import liberalization for the state of Haryana, Uttar Pradesh, West Bengal, Maharashtra, and Tamilnadu. The effect of import liberalization depends on the world price of milk products, world prices are generally low in the Oceania countries and imports at such a low price has increased consumers' benefits, increase in consumers' benefits is significantly higher than the losses to the producers causing increase in the aggregate benefits. The study further quantifies the loss in employment because of free imports of milk products at low price. The study found that the effect of import liberalization has been significantly higher for the coastal states as compared to the land-locked states of the country. The study finally discusses some ways to protect the long run interest of India's dairy sector without falling foul of the WTO.

Introduction

In India, the dairy sector is important for various reasons. Among these its complementarity with agriculture for example and a capability to enrich the protein diet of the vegetarian population is well documented. A contribution, which is not well recognized, is its role in balancing the rural inequity[1]. In recent decades the dairy sector has emerged as an important source of rural employment and income in the country[2]. The growth of the dairy sector during the last three decades has also been impressive, at more than five percent per annum; although the country has emerged as the largest producer of milk[3] only in the '90s.

This is not a small achievement when we consider the fact that dairying in India is largely a subsistence activity; farmers in general keep dairy animals in proportion to their

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free crop residues as also the available family labour with little or no purchased inputs and a minimum of marketed outputs. A restrictive trade policy for milk products and the emergence of Amul type cooperatives has changed dairy farming practices in the country. Farmers have started receiving a favourable price for their milk, and the milk production system, which was essentially a self-contained one is now being transformed into a commercial proposition. The crossbred technology has further augmented the viability of the dairy units by increasing the milk production per animal. Subsequently milk production has increased at an exponential rate while the benefits of an increase in milk production also reached the consumers as is apparent from a relatively lower increase in the price of milk.

The favourable price environment for milk producers however appears to have weakened during the 90s, a decline in the real price of milk being noticed after the year 1992. Incidentally, this is also the period in which trade liberalization in the dairy sector was initiated. In the new multilateral trading system trade liberalization is imminent with liberalization of dairy sector being mandatory. In India most of the non-tariff-barriers (NTBs) in dairy have been replaced with tariffs and tariff-rate-quotas (TRQs); now there are pressures to reduce tariff. The imperfections in the world dairy market even after years of implementation of the WTO Agreements however, continue (Jha *et al.* 2000).

In this situation any further liberalization of imports of milk products requires a cautious approach. One must not forget that in India, dairy is not merely another sector / sub-sector of the economy; this is a source of livelihood for a bulk of the rural poor. Considering its importance the Indian dairy sector may require protection. Selective protection to a sector is not WTO-incompatible, especially in the light of Harbinson's draft[4] in the ongoing millennium round negotiations on agriculture. The nature and magnitude of protection however, needs to be assessed and also postulated without doing much damage to the larger interest of the economy. Against this backdrop the present study attempts to assess the Indian dairy sector in the so-called globalizing world with the following specific objectives:

- To review the performance of Indian dairy sector
- To study the world dairy market
- To assess implications of import liberalization

In the present study these objectives have been dealt with separately in different chapters. The first chapter reviews progress of dairy sector at the aggregate and disaggregate level and also changes in the policy environment related to dairy in the country. The subsequent chapter discusses the nature of the world dairy market, and the kind of changes that WTO Agreements have brought about in this market. This chapter also studies India's trade in milk products. Chapter III evaluates the implications of import liberalization for the domestic dairy sector; the effect of trade on domestic prices and so on the constituents of dairy sector, milk producers and consumers, vary across regions. The present study therefore works out the effect for different regions of the country. The study in its final chapter Conclusions and Policy Directions discusses some ways to protect the interest of the dairy sector in the long run without falling foul of the WTO.

I

India's Dairy Sector: A Retrospect

In the history of dairy development, decade of '90s has been important on various accounts; India emerged as the largest producer of milk[5] in the world and milk emerged as one of the biggest contributor to the value of agricultural output[6] in the country. These encouraging trends in milk production was apparent in the '70s following emergence and replication of Amul type cooperatives in the country; subsequently milk production has grew at an exponential rate; per capita availability of milk has also improved, though it is still less than the recommended dose for the country. The milk yield in the country remains one of the lowest in the world. In this backdrop, present chapter reviews performance of dairy sector in the country at the aggregate and disaggregate levels in separate sections. Performance has also been assessed with respect to the changes in policy environment at the aggregate level.

I.1 Dairy Development in India

The role of government in the sustainable growth of a sector such as that of dairy cannot be over-emphasized. In India, the government's approach towards dairy has passed through three distinct phases. Though it is difficult to earmark the exact year for distinguishing these periods as a shift in policy action is are often staggered over a couple of years, the present study attempts to demarcate this on the basis of plan periods, namely, first phase (Plan I-III), second phase (Plan IV-VII), third phase (since Plan VIII).

The first phase began immediately after independence when dairy produce like many other agricultural commodities was considered as an important item to be supplied to the urban consumers at the lowest possible price. Government monopolized the milk supply and distribution through the Milk Control Board. This has led to a proliferation of middle-men in the milk supply system, and finally, a decline in the share of producers in the consumer's price of milk. As a result of this set of policies, milk production observed a linear trend growth of less than 2 per cent during the first two decades of planned development (see Fig. 1.1). This rate of growth was too low to match the growth in human population during the period and finally, the per capita availability of milk has declined during the period (see Fig. 1.1).

The per capita availability of milk in the country was already low; Government had therefore resorted to import of milk powder to protect consumers' interest. Import of milk powders, which was highly subsidized, has further deteriorated the price incentive for domestic milk production in the country; this is apparent with an almost stagnant milk yield during the period (see Fig. 1.2). Increase in milk production during the period was primarily because of an increase in the breedable bovine population (Figure 1.1) and the milk production system, which was subsistence in nature, remained so during the period. On account of this milk production in the country was in fact trapped in a vicious cycle of low price- production and yield of milk. This policy orientation continued, till the Third Five Year Plan.

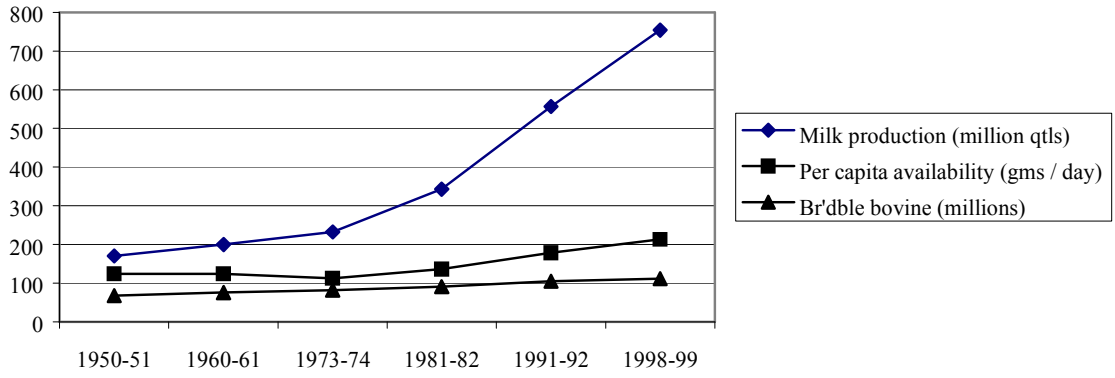
The second phase of dairy development can be distinguished from the earlier plans with a high allocation for Operation Flood (OF) programme in the fourth Five Year Plan[7]. The OF programme aimed at replicating Amul type milk cooperatives, which essentially provide a favourable price to milk producers. The OF programme and similar other dairy development programmes to strengthen cooperative networks remained important throughout the planned development. The spread of the cooperative network[8] is apparent with the growth in milk throughput (see Figure1.2). The role of Government in milk collection and processing was restricted during the period; import of low cost milk powder was also restricted.

As a result of these policies, the growth in milk production has experienced a structural break in its trend during the year 1973-74 (see Figure 1.1). The exponential trend in growth is visible during the later period. The per capita availability of milk, which started declining during the first two decades of the plan period, has shown an increasing tendency after the mid-70s (see Fig. 1.1). There has been an encouraging trend in the sources of milk production as well. The rate of growth in the breedable bovine population has slowed down after the 80s, suggesting that the increase in milk production is largely contributed to by an increase in the productivity of milch animals. This is further corroborated by an increase in the cross-bred cattle population, though this is not amply clear in the present figure[9] (see Figure 1.2), this is definitely more evident with an increase in the proportion of cross-bred cattle in the bovine population as in the Annex. Table 3. The average productivity of cattle,

which was almost stagnant during the 1951-72 period has increased especially during the 90s.

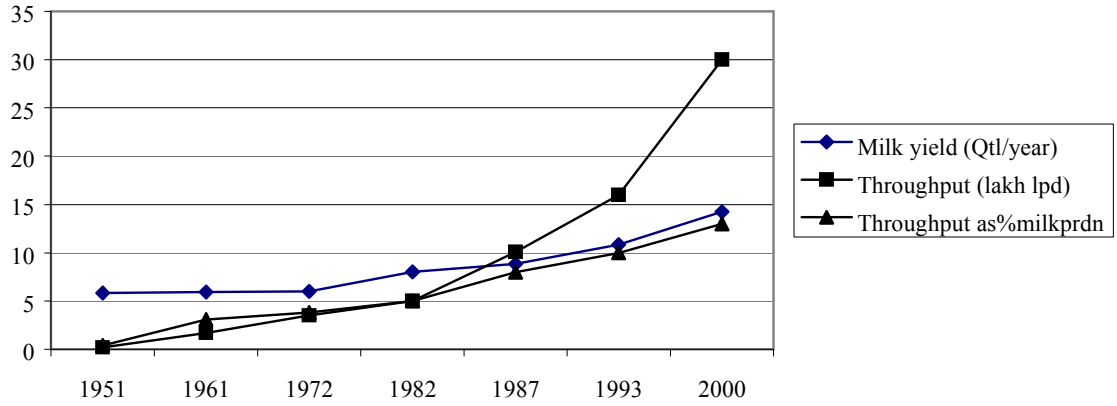
The third phase of shift in policy environment was more mandatory in a globalizing world. Following the Uruguay Round of Agreements, trade was liberalized; cost efficiency and quality was perceived as important for an economy. Many of the earlier laws and government policies underwent drastic changes in 1991s. As far as the dairy sector is concerned the manufacture of milk products was delicensed, that is, it was removed as a scheduled industry under the Industrial Development Regulation Act of 1951. Recognizing some anomalies in the pattern of investment in dairy processing, the Government of India has notified the Milk and Milk Product Order (MMPO) in June 1992, which reintroduced registration for milk processing units. The MMPO was however perceived as an entry barrier for private sector investments, and in March 2002, the government made some important amendments so that the MMPO would basically regulate food safety, quality, sanitary and hygiene conditions of all registered units. Thus most of the draconian rulings inhibiting private investments in dairy have been withdrawn (for details see Jha 2003). The cooperative processing units unlike their corporate counterparts were governed by the registrar state cooperatives; in order to unshackle the cooperatives the Companies (Amendment) Act 2002, were amended to incorporate producer companies based on the principle of cooperation into its coverage (for details see Jha 2003).

Figure 1.1 Trends in Dairy Development Indicators



Most indicators of dairy development have maintained an increasing trend around the third period. The increasing trend in some of the indicators of dairy development such as milk throughput and milk productivity have become robust during the period. This period may be referred to as a phase of qualitative growth.

Figure 1.2 Trends in Technology and Market related Indicators



It is clear from the above discussion that dairy development in the country has graduated into another phase in the 70s; for example, milk production has started growing exponentially, milk availability has also increased significantly, sources of milk production have also undergone expected changes in favour of crossbred cattle. Despite the robust trends in the dairy development of the country, milk productivity is yet less than one-fourth that in many developed countries, the proportion of milk throughput in production has been as low as 13 per cent in the year 2000. Milk availability is significantly lower than the recommended mark even at the aggregate level; this estimate varies across states suggesting a significant amount of regional disparity in the dairy development of the country (Annex Table A5). Some regional trend in the growth of the dairy sector in fact suggests that there is sufficient scope for further improvement in the dairy sector in the country. In this context, it is necessary to assess the growth performance of dairy across the country.

I.2 Dairy Development: Some Disaggregate Analysis

The rate of growth of milk production can comprehensively reflect the historical performances of the dairy sector across the states and one can also discern prospects of dairying in these states. The simple and compound rate of growth has been calculated with the linear and exponential trend equations respectively for the reference period 1977-78 to 1996-97, and the same has been presented in Table 1.1.

Table 1.1 also presents the coefficient of determination (adjusted R-square) as R-square from both the equations have some meaningful inferences, Dandekar (1980) suggests that if the exponential equation yields a higher value of R-sq as compared to the linear equation, it could be taken as evidence that the compound rate of growth over the period is not constant but is increasing and vice-versa. The R-sq also helps in understanding the reasons for disparity in the simple and compound rate of growth.

It is evident from the table (i.e.Table 1.1) that the annual average rate of growth has been higher than the annual compound rate of growth for most of the states. The rate of growth in the states of Tamilnadu, Uttar Pradesh and West Bengal, were exceptions as the compound rate of growth has been marginally higher than the simple rate of growth. The compound rate of growth for these states may be inferred with some caution, as the exponential trend for these states was not as good a fit as it was in the other states of the country. The R-sq for the exponential trend equation however varies from 0.86 to 0.89 in the aforesaid states.

The rate of growth of milk production in the states has varied widely from 3 per cent to 8.3 per cent. On the basis of the rate of growth in milk production these states can be categorized into three groups, low (less than 4 per cent), medium (4.0-6.0 per cent) and high (more than 6 per cent) growth states. Among these the low growth states are Assam, Bihar and Rajasthan; the high growth states are Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra and West Bengal; while the remaining states are experiencing a moderate rate of growth in milk production. This moderate rate of growth is in fact close to the country average.

It is encouraging to note that in most of the moderate growth states the compound rate of growth is increasing. In two of the low growth states, Assam and Rajasthan, the compound rate of growth has an increasing trend. In this context, Bihar presents a dismal picture as the compound rate of growth in milk production is not only low but is also decreasing. The

statistics in the table suggest a structural break in the trend of milk production for the states of Jammu & Kashmir and Karnataka. In both these states, the R-sq for the exponential trend was significantly higher than the linear trend equation suggesting that the linear trend is not as fit as the exponential trend.

Table 1.1: Annual Average and Annual Compound Rate of Growth of Milk Production in Important Indian States during the period (1977-8 to 1997-8)

States / Union	Annual Average Growth Rates	Annual Compound Growth Rates	Coefficient of Determination Linear	Exponent.	Inferences for trends in ACGR based on CoD
Andhra Pradesh	4.6	4.1	0.88	0.91	Increasing
Assam	3.1	3.0	0.89	0.92	Increasing
Bihar	3.7	3.6	0.96	0.94	Decreasing
Gujarat	4.5	4.2	0.91	0.91	Inconclusive
Haryana	5.1	5.0	0.97	0.98	Increasing
Himachal Pradesh	5.5	5.2	0.99	0.99	Inconclusive
Jammu and Kashmir	10.0	8.3	0.86	0.95	Increasing
Karnataka	7.9	6.2	0.59	0.81	Increasing
Kerala	6.5	6.3	0.98	0.99	Increasing
Madhya Pradesh	6.2	6.1	0.93	0.93	Inconclusive
Maharashtra	8.4	7.3	0.96	0.99	Increasing
Orissa	6.1	5.8	0.99	0.97	Decreasing
Punjab	5.1	4.9	0.98	0.99	Increasing
Rajasthan	3.2	3.0	0.97	0.97	Inconclusive
Tamilnadu	4.7	5.2	0.90	0.86	Decreasing
Uttar Pradesh	4.9	5.2	0.99	0.89	Decreasing
West Bengal	5.9	6.3	0.95	0.88	Decreasing

A disaggregate analysis of dairy development in the country presents a wide disparity across the states. While milk production rationalized with the population i.e., is per capita milk availability in the states of Punjab and Haryana was considerably higher than the country average, in some of the eastern states like Bihar, Orissa and most of the North-eastern states this has been less than one half of the country average. This disparity persists for other indicators of dairy development such as, the proportion of cross-bred population, breeding, feeding and marketing facilities for dairy in the country as well. A comparison of the historical trend in the rate of growth of milk production suggests an encouraging picture for a majority of the sates; Bihar, Orissa and the North-eastern states are however exceptions. The growth of milk production in the backward states is important not merely to improve

milk availability in these states, but also to improve the status of livelihood for a bulk of the rural poor in these states.

I.3 Conclusions

A review of dairy development in the country presents encouraging trends, in terms of milk production, per capita availability of milk, sources of milk production, as also accessibility of milk. A disaggregate analysis of the dairy sector however presents a wide disparity in the different indicators of dairy development; though the trend growth in most of the states is encouraging. Government policy has undoubtedly played an important role in achieving this magnificent success at the aggregate level, but all these have occurred under the regulated trade regime.

Appendix I

Measuring and Inferring Trend Growth

Growth rate is worked out to assess the magnitude of the rate of change per unit of time. The simple rate of growth showing an absolute rate of change per unit of time can be expressed mathematically as dyt /dt or Y(t+1) – Yt according to 't' varying continuously or taking only a discreet value. The rate of change in Y per unit of time 't' expressed as a fraction of the magnitude of Y itself, is usually termed as a compound growth rate and denoted by Cr equals to 1/Yt * d yt / d t or (Y(t+1) – Yt) / Yt . This expression multiplied by 100 gives the compound growth rate of Yt in percentage terms.

There is a general agreement amongst researchers that in view of the fluctuation in data within the study period, a point to point method of measuring the growth rates may lead to a seriously biased estimate unless due care is taken in selecting the points for comparison. Hence, a more appropriate method according to most of the scholars would be to take into account the entire series of observations over the period (Dandekar 1980). There are several simple functional forms to calculate the trend growth rate. Trend equations are also used to see the tendency of data over time, and also to estimate the magnitude of rate of change per unit of time. The more frequently used equations their algebraic forms and corresponding growth rate formula has been presented below.

i. Linear: Yt = Yo + r*t when r is the linear coefficient.

This functional form presents a constant absolute rate of change equal to 'b' per unit of time. In order to estimate the average annual rate of growth 'b' is divided by the average of the variable (Y) during the reference period. Though most scholars have used the arithmetic mean of the variable, Minhas, B.S. (1966) and Dandekar (1980) feel that the average used for this purpose should be harmonic mean of the series.

ii Exponential: Y = ab**t Alternatively, Log Y = Log a + t log b.

The loglinear or compound rate of growth Yt = Yo (1+ r)t. Alternatively, it can be written as Log Yt = Log Yo + t*Log (1+r) or Log Yt = a + bt, Where, b = Log(1+r). This form implies a constant growth rate over time; this characteristic has made it popular amongst researchers for measuring the compound rate of growth. Finally, the formula for the compound rate of growth is (antilog b – 1).

It is sometimes argued that the growth rate must take into account both the linear and exponential equations as R*2 from both the equations have some meaningful inferences. Dandekar (1980) suggests that if the linear function yields a higher value of R*2 than the log-linear (exponential) function, it could be taken as evidence that compound rate of growth over the period is not constant but is declining and vice-versa.

II

The World Dairy Market and India

In the present study the world dairy market refers to the major importing and exporting countries of milk products and their trade practices in recent years. Often certain policy changes in these countries influence the aggregate exports and imports of milk products and also their world price. The nature of the world market is also changing following the establishment of the World Trade Organization (WTO). The WTO and associated agreements attempt to establish free and fair trade in the world market, so that cost and quality would emerge as the most important determinant of trade flow in the world market. After more than seven years of their implementation it is essential to review world trade in the light of the WTO agreements and specifically to examine how India has coped with the changes in the world dairy market. The present section reviews the potential and also the pattern of trade in important milk products, the WTO Agreements and the world trade of milk products in the post-WTO era with immediate implications of the WTO Agreements for India. All these would help us in understanding the existing pattern and future trend of world trade in milk products.

II.1 The World Dairy Market

As per the FAO statistics world aggregate milk production in the year 2002 was around 555 million tonnes. Milk production as compared to production in many other commodities is better distributed across the countries. There are only two countries, namely, India (13 per cent) and the United States (12 per cent) which account for more than 10 per cent of the world milk production; while countries in the European Union, Russian federation and Oceania account for around 22, 6 and 4 per cent of world milk production, respectively. World milk production in contrast to the domestic structure of milk production[10], is dominated by cow milk. Cows and buffaloes account for around 85 and 10 per cent of world milk production; while goat, sheep and camels together account for less than 5 per cent of world milk production.

World trade in milk is limited; only 6 per cent of world milk production is traded the world over. The perishable and bulky nature of milk is often cited as the prime reason for a limited trade in milk. These demerits are overcome in the processed milk products such as milk powder, butter, and cheese. A comparison of world production and trade statistics for

milk products indicate that out of the total world production of around 45 per cent of whole milk powder, 30 per cent of skim milk powder (SMP), 11 per cent of butter and 9 per cent of cheese are traded (FAO 1999). The world trade in milk products is therefore discussed with the trade figures for these products.

The important milk products for which sufficient information is available are skim milk powder (SMP), whole milk powder (WMP), butter and cheese. Important exporting and importing countries for these products with their shares in the total world exports and imports have been presented in a pictorial form in Fig. 2.1 to 2.4. The data represented is based on trade figures for the period 2000-02. Figure 2.1 presents the important SMP exporting and importing countries. The extent of concentration in the exports market of SMP can be understood from the fact that four countries / country groups namely Australia, EU, New Zealand and US account for more than 74 per cent of world SMP exports. The imports of SMP are better distributed; four largest SMP importing countries together account for only 34 per cent of world imports. The important SMP importing countries are Mexico, the Russian federation, the EU and Japan. It may be noted that the EU is an important exporting as well as importing destination of SMP. As compared to SMP the exports of WMP are even more concentrated, EU and New Zealand together account for around 75 per cent of world exports; imports of WMP are even better distributed, four largest importers of WMP together comprise less than one-fourth of the world imports of WMP (see Figure 2.2).

The SMP and WMP are in fact substitutes of milk. Butter and cheese are among the other important milk products in the world dairy market. The EU, Australia and New Zealand together control more than 80 per cent of export market in butter; one particular country (NZ) accounts for more than 40 per cent of world exports of butter (see Figure 2.3). Imports of butter as compared to milk powder are less distributed as the four largest importing countries namely the EU, the Russian federation, Mexico and the US together account for as high as 73 per cent of the world imports of butter (see Figure 2.3). For cheese also the EU, New Zealand and Australia are the major sources of world trade, as together they account for around 87 per cent of the world exports (Fig. 2.4). Import of cheese is also concentrated as in the case of

Figure 2.1 SMP Exporting and Importing Countries

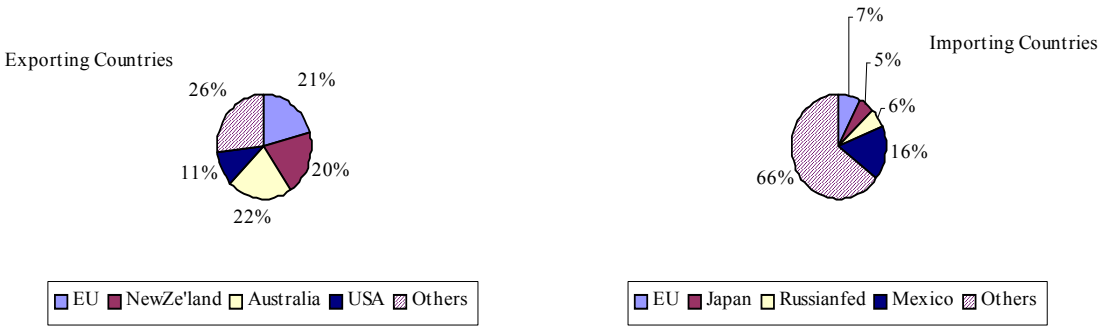


Figure 2.2 WMP Exporting and Importing Countries

Figure 2.3 Butter Exporting and Importing Countries

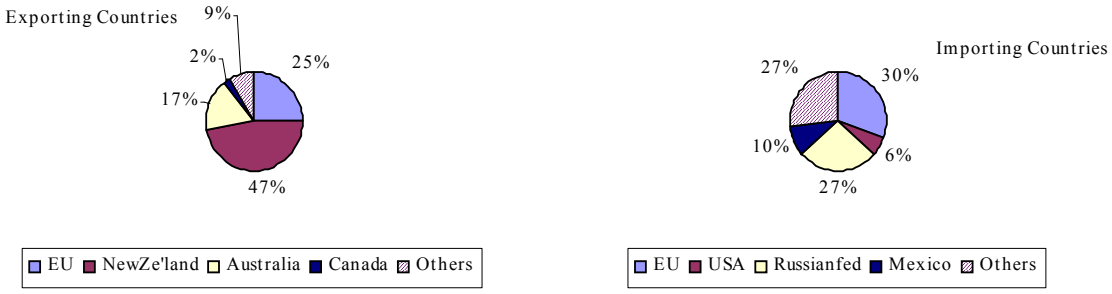


Figure 2.4 Cheese Exporting and Importing Countries

butter; here also four major importing countries account for around 77 per cent of world cheese imports. It is interesting to note that the EU and the US are important destinations as

well, accounting for 17 and 23 per cent of world cheese imports; Japan and the Russian federation are the other important importers accounting for 13 and 24 per cent of world cheese imports (see Figure 2.4).

A review of world trade statistics for important milk products suggests that the world trade in milk products especially for the export market is highly concentrated; with New Zealand, EU, Australia and the US being the major exporters of milk products. The import market is relatively distributed especially for that of the SMP and WMP imports. Milk powders are in fact substitute to milk and are traded more than the other milk products. The import market for butter and cheese is relatively concentrated with Russian federation, Japan, Mexico and Brazil being the major destinations for milk products. The nature of world trade in milk products will largely depend on the kind of policies operating in the major trading countries. Fortunately, most of the important players are members of WTO so that WTO Agreements can exercise a large influence on world trade in milk products. Therefore a review of the world trade in milk products becomes necessary.

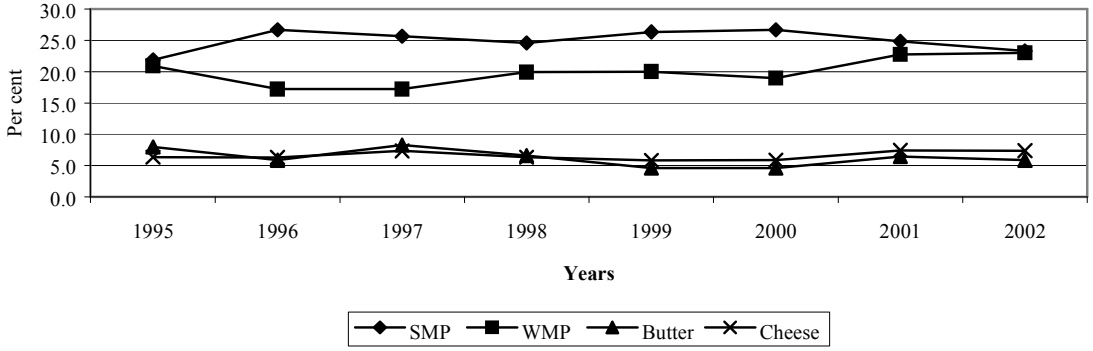
II.1.1 World Trade during the WTO Implementation Period

Implications of the WTO-induced trade liberalization for a country will be made clear by examining how the amount of trade and world price of the commodity have behaved in the post WTO phase and also how it is likely to behave in the future.

The world trade in commodities is supposed to increase after implementation of the market access provisions of the WTO Agreement on Agriculture. Though there was a fear that following tariffication, world trade would suffer as member countries could impose high tariffs while replacing the non-tariff-barriers. To avoid this situation, TRQs was imposed. There are also studies (e.g., Hathaway D.E. and M.D. Ingco 1996) to estimate the likely expansion of trade following implementation of the WTO Agreements. This particular study has calculated new access as a percentage of trade for commodities like wheat, rice, maize, sugar, beef and poultry for which the estimate varied between 0.4 per cent (sugar) to 7.5 (rice) depending on the level of protection for these commodities. No estimate has been provided for milk. To assess the pattern of trade in milk products the trend in world imports as a proportion of production during the year 1995-2002 has been presented in Fig. 2.5.

The milk products considered are the same as mentioned earlier in the discussion on the world trade of milk products namely, SMP, WMP, butter and cheese. In order to assess the proportion of trade in world production theoretically, one can take either exports or else imports as they are supposed to be equal; unfortunately they are not so[11] and the present study has deliberately used import as a proportion of world production for this presentation. It was perceived that in 1995, the year of initiation of the WTO, around 22 per cent of milk powders and 8 per cent of butter and cheese were imported the world over. In successive years there has been no uniform trend across the milk products. Imports of SMP increased marginally during the reference period though there were variations. WMP appears to be a substitute for SMP in trade as well; a decline in the proportion imports of WMP is generally accompanied with an increase in the import of SMP during the reference period. The world trade in cheese and butter has in general been in tandem. The proportion of cheese imports surpassed butter in 1999 and has maintained this increase subsequently (1999-2002) suggesting that in the forthcoming years, cheese due to its high protein content would be preferred over butter. There have been marginal changes in the trade of butter and cheese during the reference period.

Figure 2.5 Trends in World Import to Production for the Selected Dairy products



It appears from the above discussion that during the post WTO period the proportion of trade for a majority of milk products fluctuated; there has been only a marginal increase in the trade of SMP and cheese during the reference period. The primary reason for an insignificant increase in the world trade is the neo-protectionist strategy adopted in various ways by the WTO member countries, which aimed to halt the process of trade liberalization.

Of the protectionist measures, particularly important is the high tariff rate for primary commodities. Konandreas (1999) presents in tabular form the manner in which primary products in general and dairy products in particular have been subjected to high tariff peaks in the developed countries, for example, in dairy products Canada tops the list with 253 per cent, followed by Japan 158 per cent, United States 94 per cent, and the European Union 82 per cent. Most of these developed countries have also kept their options for SSGs open. Apart from a scaling down of the high tariff, in the existing tariff reduction commitments there is also scope for reducing import tariffs selectively. In the existing tariff rate reduction formula the lowest tariff receive the highest cut in order to maintain an average reduction of tariffs without making a significant impact on the effective reduction of the tariff rate[12]. Some problems such as those of high tariff were anticipated during the implementation period. Therefore, the tariff-rate-quota (TRQs) was encouraged so that the world trade might not shrink; there have been instances of arbitrary allocations of TRQs by certain countries to favour some countries (Jha B 2002).

II.1.2 World Prices during the WTO Implementation Period

A simple understanding of the WTO Agreement on Agriculture suggests that the price of agricultural commodities will increase as export subsidies and domestic support to agriculture would decrease. There are also indirect reasons for an increase in the world price of some commodities. The EU's resource retirement programme under Blue Box, for instance, discourages production of commodities. Consequently supply of these commodities will decrease and prices for the same may increase.

There have been a few studies (Goldin and Van der Mensbrugghe 1995) to evaluate the impact of WTO-induced trade liberalization on the economy in general and the agriculture sector in particular. The findings of the studies, particularly important for the present discussions, indicate increase in the world prices of dairy products following implementation of WTO agreements. In this regard, Goldin *et al* reports that world price of dairy products during the WTO implementation period would increase by 2.3 to 12.1 per cent[13] over the base period (1991-93). This increase will vary depending on the extent of trade liberalization in the member countries. Andrew et al. in a study (1994) predicted an increase of 16 per cent for milk powders, 20 per cent for cheese and 4 per cent for butter

during the implementation period. The actual price of milk products has declined during the implementation period. The primary reason for this is that various WTO member countries have devised their own set of policies often against the spirit of the WTO Agreements so as to protect their producers.

The world prices of milk products as for many other commodities fluctuate. The world prices referred to are the fob prices in the major milk exporting countries like New Zealand, US, EU and Australia and though these prices are significantly different across countries yet they move in tandem. The relative price efficiency of milk products in these countries would indicate the possible trade flows of milk products. The present study calculates the nominal protection coefficient (NPC) as an indicator of price efficiency, though the effective protection coefficient (EPC) is a better measurement of efficiency as this segregates protection in inputs and outputs as well. The latter is however data intensive and often it is difficult to find the desired information for a calculation of the effective protection especially, for an alien nation.

The NPCs have therefore been calculated only for SMP, WMP, and butter; as due to a dearth of information the NPCs for cheese could not be calculated. The NPC for a country has been calculated by comparing the price in that country with the world prices. The FOB price in New Zealand has been considered as the benchmark for world price in present analysis as New Zealand apart from being an important exporter does not adopt any major trade distortionary practice. The NPCs for a commodity require that prices are comparable; in the present analysis comparable prices are the FOB prices.

In order to observe the pattern of changes in the level of price efficiency, protection coefficients were calculated for two time periods. The earlier period coefficient is based on an average for the years 1995 and 1996; the recent years for which coefficients have been calculated are 2001 and 2002; the coefficients for later year were not pooled as the estimates were not similar unlike the earlier years.

The price ratio, which is close to the nominal protection coefficients, is one for New Zealand since prices in numerator and denominator here are same. The price ratios for the US are fluctuating, in milk powders a temporal comparison of protection indicates that the level of protection declined in the year 2001 but increased in the successive year 2002. In butter, the levels of protection maintained an increasing trend during the reference period; it was as high

as 121 and 135 per cent in the year 2001 and 2002, respectively. It is interesting to note that the US in spite of significantly higher prices for milk products as compared to New Zealand is a major exporter in the world market. Though part of this can be explained by its location advantage, different forms of export subsidy also play an important role.

Table 2.1: Relative Price Efficiency of Milk Products in the Selected Countries

Dairy products	**FOB price ratios,1995-6**			**FOB price ratios, 2001**			**FOB price ratios, 2002**		
	USA	**EU**	**NewZ'**	**USA**	**EU**	**NewZ'**	**USA**	**EU**	**NewZ'**
SMP	1.47	1.41	1.00	1.02	0.99	1.00	1.46	0.97	1.00
WMP	1.68	1.65	1.00	1.48	0.97	1.00	1.81	0.98	1.00
Butter	1.32	2.01	1.00	2.21	1.07	1.00	2.35	1.18	1.00

The US, for instance, in its Farm Act, 1996 has re-targeted its funds previously available for export subsidy to market promotion. It has also expanded its Export Credit Guarantee Programme[14]. Though many countries, for example the US, EU, Canada, Australia, Sweden, Finland, Norway, Austria, China, Brazil, Czech Republic, Cyprus, Iceland that subsidize exports of dairy products, the US and EU are the major export subsidy provider (Konandreas 1999). Nevertheless subsidies are also concentrated in few commodities and also for specific destinations [15] (Jha and Debroy 2000). The export subsidy was supposed to decline during the implementation period. This has however not occurred due to various reasons, namely, the carry over of unused subsidy in successive years, shifting supports within an aggregate and the use of front/back loading provisions[16].

A temporal comparison of price ratios for the EU presents a remarkable change in its level of protection. During the earlier period (1995-96) the protection to milk powders was as high as 41 and 65 per cent for SMP and WMP respectively while for commodities like butter the protection level was more than 100 per cent. In recent years the level of protection has decreased abruptly, with milk powder not being protected at all while butter was only marginally protected in the EU. An earlier study (Jha, B. *et al.* 2000) that calculated the nominal and effective protection of milk products in the EU had found that milk products were protected at the output as well as input levels. The protection level in the EU has however, decreased with the incorporation of protection in inputs; in other words, the effective protection has been less than the nominal protection coefficients in the EU during the reference year 1995 (Jha, B. *et al*. 2000).

The price ratios for milk products declined in the EU primarily because of a restructuring of the incentive policies under the Common Agricultural Policy (CAP). The EU has reduced support prices and increased producer payments that are linked to production-limiting programmes. The income support to farmers was decoupled from the production; the direct income support has in general been sufficient to cover the fixed cost so that the private cost of production decreases and so do the domestic prices and the levels of protection as apparent from the output prices. The EU countries have thus resorted to income, rather than the price- based support under its Common Agricultural Policy (CAP).

In many other developed countries the dairy sector continues to receive considerable support; the country / commodity-wise estimates indicate that in milk, Japan, EU, Canada and the US have a very high level of protection while Australia and New Zealand have a relatively low level of protection (OECD 2001). The selected countries have utilized the provisions of AoA to benefit their producers and in this process world trade in agriculture, particularly dairy, remains distorted (for details see Jha 2000, Jha *et al* 2000, Sharma *et al* 2002). Many of these problems were expected; in fact article XX of the AoA accepts fundamental reforms in agriculture as an on going process and calls for a periodic review of the AOA.

II.1.3 Millennium Round of Negotiations and Harbinson's Draft

The review period in the case of the WTO Agreement on Agriculture (AoA) is five years, and it may be noted that in March 2001 negotiation on AoA has already started. The WTO member countries have placed their own positions regarding the implementation of the WTO Agreement on Agriculture. It is obvious that the individual country position was to help their own producers, and since the problems of producers in member countries vary widely their positions on the implementation of the agreement also varied widely. As a consequence, agreements amongst the WTO member countries on various trade-distortionary practices could not be arrived at. Finally, Stuart Harbinson drafted a paper, which on a limited scale is a compromise amongst the wide and varied trade concerns related to agriculture of the WTO member countries. This provides a basis for further negotiations on agriculture. Some important provisions of the Harbinson's draft are presented below under different sub-headings.

In relation to improvement in market access, the Harbinson draft suggests a few measures among which the differential rate of tariff reduction for high, intermediate and low tariff commodity is one. Regarding the differential rate of tariff reduction, the draft suggests the Swiss formula wherein tariffs are reduced the higher they are in the base period tending towards tariff harmonization. This formula places an upper bound (a*) on all tariffs. As per the formula, the tariff in terminal years (Tn) is equal to (a*Ti)/(a*+Ti) where Ti indicates tariff rates in the initial years.

While the Harbinson draft advocates a continuance of TRQs, it argues that concerns relating to the administration of TRQs be resolved by allocating quotas on a most-favoured-nation (MFN) basis. The draft suggests that the special safeguards (SSGs) may be continued for the next five to seven years.

In relation to the reduction in various trade distorting subsidies, the Habinsons draft suggests that half of the export subsidy may be reduced in the next five years while the remaining half may be reduced over nine years. The Blue Box policies (subsidies mentioned in the Article 6.5 of the AoA) according to the Draft need to be reduced by one-half in the next five years. The draft maintaining status-quo argues that there is no restriction on the Green Box (Article 2 of the AoA) while other subsidies need to be reduced by 60 per cent over the next five years.

The draft also addresses the non-trade concerns of the member countries. It recognizes developing countries arguments about the importance of some commodities in their economy, in other words it recognizes products that are strategic for the developing countries. The draft also stresses the importance of protecting the small family farms, and recognizes similar other concerns related to food security and rural development in developing countries.

The Harbinson's draft attempts to liberalize world trade in agriculture but is often censured as being pro-developed world. This is because it has not linked up import tariff reduction by which developing countries are affected, with the reduction of various subsidies to agriculture and the dairy sector, generally provided by the developed countries. The draft has also provided a greater time frame for the reduction of export subsidies. Despite this the developed countries especially the US and EU are not very happy with the draft, and are trying to draw more concessions to protect their own interest during the negotiation process.

The road map for trade liberalization in agriculture inclusive of dairy is, however, clear with the draft.

II.2 India's Trade of Milk Products

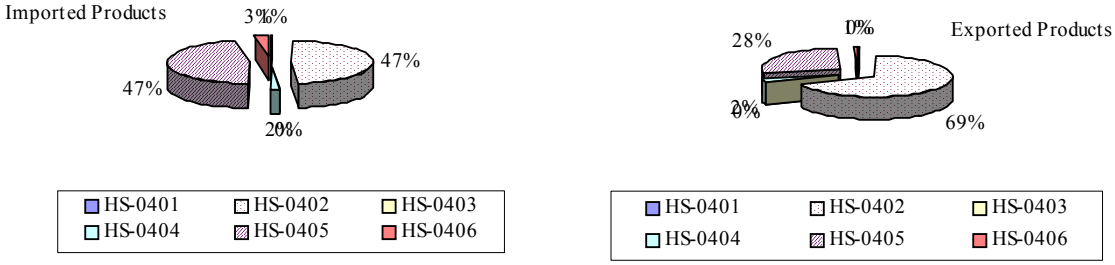
The effect of change in the world prices and volume of trade will be felt by most of the trading countries. The extent of this effect will vary across the countries depending on the degree of openness in the economy, the importance of trade in the respective commodity for the country and similar other factors. In this perspective, it is necessary to review India's trade policies and performance in milk products.

Milk products have always been an important traded item for India. In the initial years of independence while the country was highly dependent on imports for managing its urban milk supply, import of SMP was allowed at zero import tariff. In successive decades towards the end of the 60s, trade in milk products was either restricted or canalized. With the spate of trade liberalization measures in the early 90s, trade restrictions for many dairy products were dismantled. Imports and exports of dairy products, which were earlier restricted and canalized through the National Dairy Development Board (NDDB), and Agriculture and Processed food Exports Development Authority (APEDA), respectively, were freed, and moderate tariffs were imposed. The import of milk powder, as per one of the earlier GATT agreements, was being allowed at a rate of zero per cent. There has been spurt in imports of milk powders, which were highly subsidized in certain WTO member countries. The zero-duty bound rate in milk powder was finally renegotiated and TRQs was imposed towards the end of the 90s.

A brief review of the trade liberalization in milk products during the 90s suggests that trade in milk products would have become important during the period. The pattern of trade in milk products has therefore been discussed subsequently. In most of the earlier discussions on trade, trade statistics were at the three-digit level and the source for the same was the FAO Trade Year Book. The data here pertains to selected commodities like the SMP, WMP, butter and cheese only. India however exports some traditional indigenous products; trade in milk products has been compared with the DGCIS data[17] since this delineates information at a more disaggregate level, and the present comparison has been restricted at the four-digit level.

Trade statistics at the four digit level (see Annex Table A8) indicate that milk and cream not concentrated (HS 0401) are not an important item for either exports or imports as perishability and bulkiness of this sub-group of milk products restricts its trade. This is more evident from the fact that the alternate form of milk products that is, milk concentrated, etc. (HS 0402) is an important item for exports as well as import. It is apparent from Figure 2.6 that this subgroup contributes to more than two-thirds of the total exports of dairy products in the country; while this sub-group accounts for almost half of total imports of dairy products in the country. This particular commodity group of dairy comprises of skim and whole milk powder, which India has been importing since the last few decades. This sub-group of dairy products also includes sweet meats and similar other concentrated and sweetened milk products, which India exports.

Figure 2.6 Average Share of Imported and Exported Dairy Products in India (1999-01)

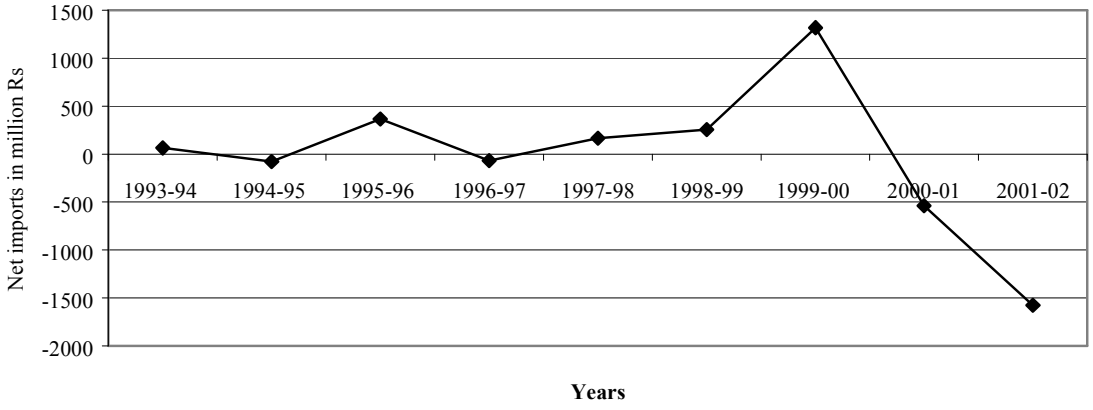


As per the Harmonised System of code (Annex Table A8), yoghurt and buttermilk are placed together in HS 0403, a sub-group of dairy products, which is being exported in small amounts. Import of this commodity is also negligible, as is revealed with the average trade statistics of the year 1999-2001. Similarly, another sub-group (HS code 0404) consisting of whey and whey-based products are not important from the trade point of view, though this group of milk products is being exported and imported in small amounts. Another important tradable dairy product is butter and similar high-fat milk products like, butter oil, dairy spread which are placed in HS 0405. This group is more important from the import point of view constituting almost another half of the aggregate imports of dairy products in the country. This group is also important for exports and accounts for more than one-fourth of India's exports of milk products. In recent years, cheese has emerged as an important dairy item for imports. Cheese and curd are placed together in the product sub-group (HS 0406), though curd is not as important as cheese for trade in India. A small amount of cheese is also

being exported. India with a sufficiency in buffalo milk has in fact the advantage of producing and exporting "mozzarella" cheese.

The above discussion suggests that milk powders (under the HS code 0402), and butter (HS code 0405) are the most important tradable items for the country. Cheese (HS code 0406) is emerging as another important item for imports. India also exports a significant quantity of dairy products, exports of dairy products falls under major two categories. The first group consists primarily of indigenous dairy products like, sweet meats, buttermilk, whey, while the second group consists of standard milk products like milk powders. The first group of dairy products consists of highly specialized dairy products in which there are not many players in the world market; whereas export performance of the second category of milk products depend more on the world price of the milk products; though there are various factors[18] to influence exports and imports of milk products in the country. The SMP for instance are exported to the neighbouring countries when world prices are too high.

Figure 2.7 Net Imports of Dairy Products in India



The world price of milk products, like many agricultural commodities, fluctuates and so trade in milk products also fluctuates. Trade in the selected milk products group has fluctuated so much so that it is difficult to discern a meaningful trend in the trade of the individual milk product category. The trend in the trade of milk products has therefore been compared with the aggregate data. The aggregate data on trade of milk product is worked out by summing up six milk product groups at the four-digit level. The trend in trade of milk products has been presented in Figure 2.7. India has been a net importer of milk products for a large part of the reference years. The country however exports milk products often in

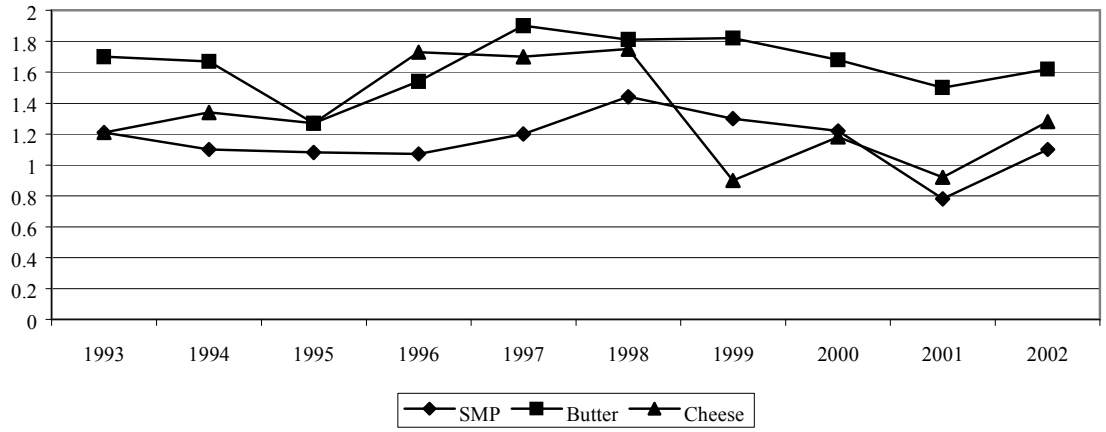
significant quantities. The quantum of exports during certain years has been so high that India has been turned into a net exporter of milk products. This situation prevailed in the years 1994-95, 1996-97 and also in the recent past (2000-2002). India's trade in milk products is apparently influenced by the prices in the world dairy market, since any abrupt change in other determinants of trade in milk products in a country like India is not expected.

II.2.1 Protection Coefficients

The kind of protection a commodity receives is an essential element of the country's trade policy. The present exercise finally assesses the trend in the protection of dairy products by calculating NPCs for selected dairy products, such as, SMP, butter and cheese in India. The NPCs in the present analysis is the ratio of the Indian fob price to that in the New Zealand. The Indian fob price has been arrived at from the domestic market prices by adding into it the cost of transportation, handling and similar other charges. The domestic market price here is the average price of five metropolitan markets namely, Delhi, Mumbai, Chennai, Kolkata and Kanpur, for which prices are available from the published sources. The fob price has been constructed to make the domestic price comparable to the border price (fob) in New Zealand. The NPCs have been calculated for a relatively longer period 1993 to 2002 to ascertain trends in nominal protection for these commodities, which have been presented in a pictorial form in Fig. 2.8. This is incidentally the period when the dairy sector passed through different phases of the tariff policy in the 90s.

The NPCs indicate that the level of protection for all the milk products have been positive (greater than one) barring a few years like 1999 and 2001 when the NPC was less than one for the selected products like cheese and SMP. The world prices for SMP and cheese during the aforesaid years were on the higher side. The NPCs have in general been higher for butter, for most of the years the protection being more than 50 per cent (NPC more than 1.5), though there were periodic improvements in the level of protection. In general butter is more protected in the trading countries such as India, EU and the US (see earlier section). It appears that the world price of butter is ruling at a lower level; perhaps due to its decreasing market potential as it is fat-rich while the consumer's preferences in developed countries are switching towards protein-rich milk products like cheese.

Figure 2.8 Trends in NPCs for the Selected Indian Dairy Products



Cheese and SMP had a similar level of protection during the earlier year of reference (1993); subsequently, NPCs for these products started diverging. The over all trend in NPCs for these products was similar. The level of protection for SMP was in general lower (less than 40 per cent) than the other milk products. A decreasing trend in NPCs after the year 1998 was noticed; this was probably the year when TRQs was imposed for SMP. The lower level of protection for an essential milk product like, SMP is obvious. An earlier study (Jha *et al.* 2000) shows that in India even though milk products are a protected item, the price of milk in the country has been one of the lowest in the world. This suggests significant inefficiency in the processing of milk and milk products in the country.

The above discussion suggests that milk products were ranged in different levels of protection, while protection was low for SMP it was high for butter. There have been periodic ups and downs in the level of protection. The fluctuating world prices, and a variation in the tariff rate are important factors behind the periodic trend in these protection coefficients. The pattern of trade exports vis-à-vis imports and its amount is another important factor that influences protection coefficients.

II.3 Conclusions

The world trade in milk products is important as it accounts for around 25 per cent of the production of milk powder; the corresponding figure is however low (8 per cent) for butter and cheese. In the world dairy market, exports are dominated by the US, New Zealand, EU, and Australia. India also exports a sizeable amount of certain milk products like sweet meats,

butter milk and whey. This is often constrained by the arbitrary quality standards of some developed countries. Selected developed countries, especially the EU and the US by careful orchestration of their domestic and trade policies continue to distort the world dairy market. In the periodic review of the WTO Agreement on Agriculture, the Harbinson draft attempts to break the deadlock between the developed and developing countries and suggests the road map for trade liberalization. Its time and mode of adoption is however not clear.

In India, the trade in milk products has gained in importance with trade liberalization. Trade in most of the milk products has fluctuated during the 90s, the fluctuation being so marked that it is difficult to discern some trend. At the aggregate level India has been a net importer of milk products during a large part of the reference period, though it has emerged as a net exporter in certain years. The reason for this fluctuation may primarily be attributed to the world prices of milk products. This is further reinforced by the trend in protection coefficients of milk products.

Appendix II
Nominal Protection Coefficients

The Nominal Protection Coefficient (NPC) is the ratio of domestic to world prices. NPC helps in measuring the divergence between the domestic and international referred price. The domestic price and border price must be comparable; for instance if the border price referred to is the FOB price at a foreign port, the domestic price of the commodity should also be adjusted to arrive at the FOB price at the domestic port. An NPC less than one, indicates that the commodity is not protected while an NPC greater than one indicates that the commodity is protected in the country.

III

Implications of Import Liberalization

India has traditionally been an importer of milk products. Despite the exports of certain milk products that have taken place, the country remained a net importer of milk products during large part of the '90s. In India, milk products are protected by a moderate tariff, which will be reduced during the successive round of trade negotiations. The WTO-incompatible subsidies will also reduce though the kind of subsidy or income-based support certain developed countries have been providing will continue. India as compared to efficient producers of milk products such as New Zealand is not price efficient. Considering the differences in the nature of milk production in both the countries, for India to achieve the same level of efficiency is only a remote possibility[19]. In this situation further liberalization of import of milk products may have large implications for the dairy sector and also for the rural economy of the country.

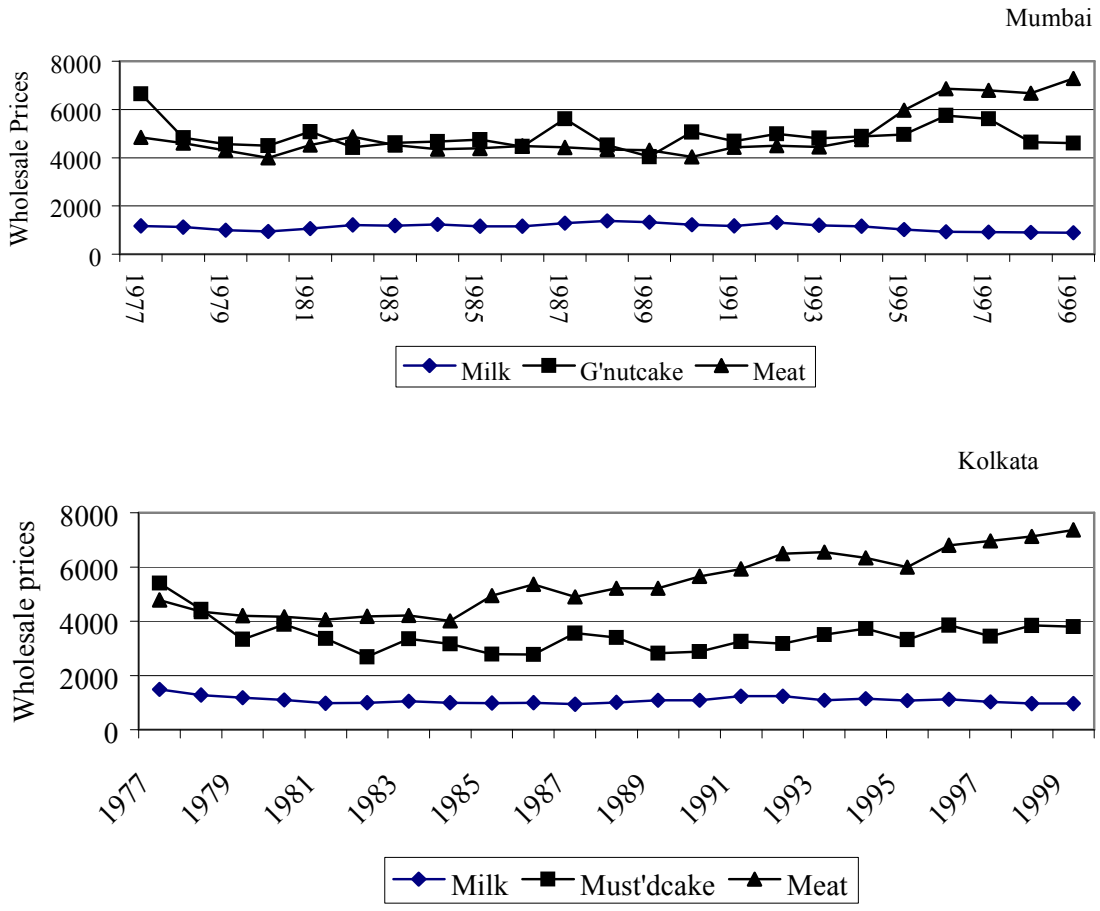
The present chapter attempts to assess the implications of import liberalization for different components of the dairy sector, producers and consumers across the regions. This chapter first studies the implications of import for the domestic price of milk; and then the effect of change in milk price has been evaluated for producers and consumers of milk products in the selected states of the country.

III.1 Implications for Domestic Prices

With trade liberalization, prices (real price) of commodities, especially where protection was high, are supposed to decline as inflation in the world market is not as high as it is in the domestic market. By the same argument, the prices of commodities, which are dis-protected are supposed to increase. The long-term growth of a sector requires that a decline in prices of a commodity should also be accompanied with the similar decline in the items used for its production, for example, oil cakes in milk production[20]. There is also a need for parity in the product price for balanced growth, which means that the prices of similar products move in harmony. From the consumption point of view, meat is another important source of animal protein like milk.

A comparison of milk and meat prices is also important since milk is protected while meat is disprotected in India (Debroy, Jha, Pailwar 1996). An attempt has been made to compare the trend in these prices across the regions, though the present comparison is restricted to Mumbai and Kolkata (Figure 3.1) only as suitable information for other regions of the country is not available. Prices in the present comparison are the real prices. The real price has been obtained by deflating the nominal prices with the income deflator obtained from the Development and Planning Center of the Institute of Economic Growth.

Figure 3.1 A comparison of milk, meat and oilcake prices in Mumbai and Kolkata



The pictorial presentation of real prices shows that the fluctuation in milk price is lesser when compared to the prices of oil cakes and meat. In both the market's real price of milk was more stable during the 1980-92 period. A declining trend in milk prices has started from the year 1992, a trend even though small is noticed as decreasing in both the markets. The prices of oilcakes were fluctuating so much so that it is difficult to discern a definite

trend in the oilcake prices, though an increasing trend at least in the Kolkata market is evident. The real prices of oilcakes in both the markets are significantly different since in Kolkata it is the mustard oil cake while it is groundnut in Mumbai. The real prices of meat registered the maximum growth, having almost doubled in nine years in Mumbai. A comparison of meat prices in both the markets indicates that the prices of meat in these markets have converged during the reference period, for example, in the year 1990 the real prices of meat in Kolkata were 1.45 times higher than the price in the Mumbai. The corresponding prices were almost same in the year 1999. It is also evident that following trade liberalization, the real price of milk has declined while that of oilcake and meat increased.

An effort was made to establish a causal relationship between the domestic milk prices and imports of milk products. In this exercise, domestic milk price was regressed on net imports of milk products in the country; the estimated equation has been presented below.

$$\text{DOMESTIC PRICE} = \underset{(74.85)}{1369.74^{**}} - \underset{(0.12)}{0.19^{*}}\ \text{NETIMPORT} \quad (R^2 = 0.21)$$

The estimated equation though weak (adjusted R square is 0.21) shows that net imports of dairy products explains only a 21 per cent of variation in domestic prices. The estimate is also weak (significant at 10 per cent only) the sign of the estimate is however relevant suggesting that a 1 per cent increase in net import of dairy products will reduce domestic prices of milk products by 0.19 per cent only.

III.2 Effect of Imports on Domestic Milk Prices

As is apparent from the above discussion, import in general reduces domestic prices. The effect of import on domestic prices would also vary according to the stage of marketing. Several market functionaries are involved in different stages of marketing; the cost of marketing and the share of these functionaries in the marketing cost also varies across commodities and markets[21]. In order to assess these factors, the market price of imported milk products has been worked out at different stages of marketing. These prices, which are more explicitly reference prices are arrived at from the import parity price taking into

account the cost of marketing and transport at various stages of imports. This has been presented below with the underlying assumptions behind these prices.

Delivered Duty Paid Prices (DDP Price) or Price Ex-Port: The present analysis is about assessing the effect of imports, therefore, the world price is the CIF price. This is the price of the commodity on board at the sea-shore of the importing country. Once the imported commodity crosses the customs boundary at port and enters into the domestic market, its price has been termed as price ex-port in the present analysis alternately, the Delivered Duty Paid (DDP) price. Even if a commodity is free-from-customs-tariff, the imported commodity requires some expenditure at the port in the form of obtaining various clearances and handling cost, which as per the trade estimate is generally four per cent of the value of import.

Import Price in the Domestic Wholesale Market: This is one step beyond the DDP price as this price includes the cost of marketing. A significant part of the marketing cost is common for all the markets since the marketing channels for a product are often similar. In spite of it the cost of marketing will depend on the distance of the respective markets from the port. Based on these variants, the cost of marketing and transport in the present analysis will vary from 10 to 30 per cent of the value of products in the wholesale markets of the chosen states of the country.

Producers Price under Free Trade: Generally changes in the wholesale prices are transmitted at the producers level. Though experience shows that in certain products the backward transmittance from the wholesale to the producers level is generally low when price changes are favourable for the farmers and that this transmittance is high when it is not favourable to farmers. The existence of the milk cooperative network in a large part of the country would however reduce this imperfection and the present study assumes that changes in the wholesale prices are transmitted at the producer's level proportionately.

The world price of milk is an enigma since trade in fresh milk is limited because of its perishability and bulkiness. In the world dairy market a bulk of the trade takes place in milk powder and butter; and since milk can very easily be converted into either of these products the present study assumes that the world price (fob) of these milk products after proper conversion with the milk equivalent would represent the price of milk in the international market. From the Indian perspective also butter and milk powders are important; world milk

prices are derived from these commodities to assess the implications of import for producers and consumers of milk products in the country.

Table 3.1: Tracking and Comparing Different Ranges of World Milk Prices, (Low-Rs. 647, Intermediate-Rs.850 and High-Rs.1140 per quintal), with the Domestic Milk Prices in Selected States of India as in the Year 1999

Prices in Rs per quintal

Particulars	**H'ana**	**M'shtra**	**T'nadu**	**WBngal**	**UPesh**
Ex-port Price (DDP Price)					
with Low range of World Price	----	810	810	810	----
with Intermediate range of WP	----	1204	1204	1204	----
with High range of World Price	----	1425	1425	1425	----
Market price under free trade					
with Low range of World Prices	980	895	885	930	965
with Intermediate range of WP	1400	1280	1270	1310	1384
with High range of world Price	1560	1490	1485	1500	1530
Existing price in Domestic market	**1225**	**1300**	**1200**	**1250**	**1175**
Change in prices (%)	-20.0	-31.2	-26.3	-25.6	-17.9
Trade possibility					
with Low range of World Price	Import	Import	Import	Import	Import
with Intermediate range of WP	TNP	Import	Trade not possible (TNP)		
with High range of world Price	TNP		Chances of exports		
Producer price under free trade					
with Low range of world price	824	750	734	759	788
with Intermediate range of WP	LU	1073	Largely Unaffected (LU)		
with High range of world Price	Will be largely unaffected				
Producers prices: existing	**1030**	**1090**	**995**	**1020**	**960**

The export price in the US and New Zealand has been referred to as the world price since these countries are the major suppliers of milk products in the world market. The EU is another important player but the price of milk products in this country group conceals income support to farmers. In other words, milk product prices are highly distorted and therefore have been ignored for the present analysis. In general, prices in New Zealand are significantly lower than in the US. Prices of butter in New Zealand during some years have been as low as US$ 1020 per MT, in certain other years these have been as high as US$ 1800 per MT; though the price averages at around US$ 1400 per MT. In the US, the price of butter ranges from US$ 2400 to 3100 per MT, the mode is however US$ 2800 per MT. The price of milk powder in New Zealand ranges between US$ 1500 to 2065 per MT, while in the US this varies between US$ 2050 to 2650 per MT during the last few years.

The world price of milk has been arrived at from the prices of milk products in these countries. The conversion of milk powder and butter from milk is 10 and 7.5 per cent respectively. The synthesis of butter from milk also yields whey; therefore arriving at milk prices from butter also requires considering the price of whey in the international market, which however is not available. Whereas the whole milk powder is just a concentrate of milk, therefore arriving at the milk price from the whole milk powder is easy and has been used in the present analysis.

A lower range of the world price of whole milk powder is US$1500 (fob) per MT at a New Zealand port; the higher range of world price is US$2650 (fob) at one of the ports of the US; an intermediate range of the world price for milk powder US$2050(fob) per MT also exists in either of the above countries. The world price (fob) of milk in these scenarios will be Rs.647, Rs.1140, and Rs.884 per quintal[22], respectively. For future analysis an intermediate range of the world price for milk has been assumed considered at Rs.850 per quintal since this to some extent reflects the mid point between the extreme prices. The implications for imports at these extreme prices will be different.

The present analysis starts with a low international price, that is, Rs.647 per quintal on board in the exporting country. The cost of import that is the cost of transshipment (insurance and freight) handling and customs clearance charges at port has been assumed as uniform for all the chosen port cities of India namely, Mumbai, Chennai and Kolkata. With these assumptions the milk equivalent price ex-port in these port cities will be Rs.810 per quintal. This price has been used further to arrive at the price prevailing in select wholesale markets of the country and this is presented in the second row of the Table 3.1. A comparison of these prices with the existing wholesale prices in the respective markets indicates that the existing prices are significantly higher than the international reference prices. This difference in price suggests the possibility of milk product imports. This price difference is the highest in Mumbai followed by the Chennai, Kolkata, Delhi and Kanpur markets. The lowering of wholesale prices in these markets following imports will be transferred at the producers level as well. Producers' prices in the respective regions have also fallen drastically with the low international price, as is apparent from the last but one row of Table 3.1.

The effect of import will be different when the world price is in the intermediate range (Rs.850 per quintal, fob). At this level of the world price, the DDP price in the major

port city of the country will be Rs.1204 per quintal; the reference price in the wholesale market will be even large. A comparison of these reference prices with the domestic prices in the wholesale markets shows that only in Mumbai domestic price is the higher than the reference price; the price difference suggests a possibility of import at the Mumbai port only. Trade possibility is not apparent in other places. With an even higher international price (Rs.1140 per quintal, fob), the DDP price at the Indian port will be Rs.1425 per quintal. This price is significantly higher than the existing prices in the domestic market; import possibility at such a high price is dim. In fact there are chances of exports from the Chennai, Kolkata and Kanpur markets since domestic prices are significantly lower than the international reference price. Yet, the difference in price is not so high as to call for free exports of this to distant markets, though there is a possibility of exports to some neighbouring countries Domestic prices in these situations will be largely unaffected.

Changes in milk prices at different stages of marketing following import liberalization will affect production as well as consumption of milk in the country. The quantification of the changes in production and consumption of milk will depend on the supply and demand elasticity of milk with respect to its prices; the subsequent sub-section therefore discusses the supply and demand elasticity of milk products for the selected states of the country.

III.3 Milk Supply and Demand Elasticity

There are some studies, which estimate the demand for milk and milk products along with the other food items. These studies that are varied in their approache have estimated demand elasticity with respect to its price and income, among these widely quoted studies are those by Radhakrishna and Ravi (1990), and Kumar (1998) and the estimates for these have been presented in Box 3.1. Apart from these, Jain (1992) has estimated the price elasticity of demand for milk in rural and urban India at -1.4 and –0.53, respectively. Gandhi and Mani (1995) have worked out the income elasticity for milk across various expenditure groups. The expenditure elasticity for the quintile close to the average per capita income of the country is 1.8 and 1.2 for the rural and urban population, respectively. A comparison of these elasticity coefficients presents wide variations in price elasticity; though the coefficients of Radhakrisna (1990) and Kumar (1998) are similar. Again in all these studies barring that of

Kumar (1998), the estimate for income elasticity is greater than the price elasticity of milk. For similar other commodities also the income elasticity has been greater than the price elasticity. The demand elasticity estimates of Radhakrishna *et al*. (1990) have been considered in the present analysis for obvious reasons.

Box 3.1: Price and Income Elasticity of Demand for Milk

Studies	Price Elasticity		Income Elasticity	
	Rural	Urban	Rural	Urban
Radhakrishna	-0.68	-0.56	1.15	0.99
Kumar P.	-0.63	-0.66	0.46	0.37

Of the limited studies on supply of milk, most of these (Munshi *et al* 1994, Lalwani 1989) have estimated milk supply as a function of price of feeds and fodder rather than milk price. Some studies on supply functions, which establish a relationship between the milk supply and milk price along with the other determinants are normative in nature; supply estimates (with respect to price) obtained from these functions have been as high as 5.6 and 3.6 for cow and buffaloes, respectively (Ratnam 1985). A comparison of these supply estimates with similar other biological products raises doubts about their acceptability for the present analysis. An attempt has therefore been made here to establish a relationship between milk supply and its price. Moreover the likely effect of a free import of milk products for producers, and consumers of milk has been assessed for Maharashtra, Tamilnadu, West Bengal, Uttar Pradesh, and Haryana. Milk supply and demand elasticity needs to be estimated separately for these states. Since the purpose of present analysis is to arrive at elasticity coefficients, the double-log form of the equation for supply and demand for milk has been estimated.

The study assumes that the supply of milk in a state is dependent on the price of milk with a lag of 3 years (MILPRICE). The cost of milk production (COP) here is the price of oilcakes and agricultural performance/ income (AGINCM) of the state. A lag of three years implies that the effect of a change in milk prices on the supply of milk at the aggregate (state) level will be realized only after a lag of three years; which is the period when a female calf graduates into a milch animal. In India milk production is often considered as complementary

to agriculture. The present analysis therefore considers agricultural income as an indicator for performance of agriculture and has been considered as one of the independent variables. The cost of production generally affects the supply of a commodity. In India since the time series information on the cost of milk production is not available, this has been approximated with the price of oil cake in the present analysis. The underlying assumption is that with an increase in the prices of oilcakes the cost of milk production will increase and the supply of milk will decrease in the selected states of the country. The supply equation has been estimated for the five states and the same has been presented below. The suffix indicates states such as Haryana (H), Maharashtra (M), Tamilnadu (T), West Bengal (W), and Uttar Pradesh (U).

$$\underset{}{\text{MILSPLYH}} = \underset{(1.14)}{11.48^{**}} + \underset{(0.26)}{0.68^{**}}\ \text{MILPRICE} + \underset{(0.09)}{0.18^{*}}\text{AGINCM} - \underset{(0.12)}{0.23^{*}}\ \text{COP} \quad (R^2 = 0.98)$$

$$\underset{}{\text{MILSPLYM}} = \underset{(1.54)}{8.69^{**}} + \underset{(0.36)}{0.74^{**}}\ \text{MILPRICE} + \underset{(0.09)}{0.04}\ \text{AGINCM} - \underset{(0.12)}{0.17^{*}}\ \text{COP} \quad (R^2 = 0.97)$$

$$\underset{}{\text{MILSPLYT}} = \underset{(1.85)}{10.98^{**}} + \underset{(0.29)}{0.61^{**}}\ \text{MILPRICE} + \underset{(0.71)}{0.07}\ \text{AGINCM} - \underset{(0.20)}{0.13}\ \text{COP} \quad (R^2 = 0.91)$$

$$\underset{}{\text{MILSPLYW}} = \underset{(3.45)}{8.19^{**}} + \underset{(0.29)}{0.40}\ \text{MILPRICE} + \underset{(0.34)}{0.81^{*}}\ \text{AGINCM} - \underset{(0.17)}{0.89^{**}}\ \text{COP} \quad (R^2 = 0.89)$$

$$\underset{}{\text{MILSPLYU}} = \underset{(1.54)}{12.98^{**}} + \underset{(0.36)}{0.68^{**}}\ \text{MILPRICE} + \underset{(0.11)}{0.14}\ \text{AGINCM} - \underset{(0.12)}{0.17^{*}}\ \text{COP} \quad (R^2 = 0.96)$$

***Note*:** The milk supply equation for the states of Maharashtra (MILSPLYM), Tamilnadu (MILSPLYT), Uttar Pradesh (MILSPLYU), West Bengal (MILSPLYW), Haryana (MILSPLYH) has been presented with the elasticity coefficients for milk prices (MILPRCE), agricultural income (AGINCM), and cost of production COP). The significance of these elasticity coefficients has been presented with the asterisks ((asterisks (*) and (**) indicate significance at the 10 and 1 per cent level respectively)), standard errors associated with the individual estimate have been presented in the parentheses just below the estimates. The coefficient of determination (R^2) adjusted with the degree of freedom has been presented in the parentheses in the row of the estimated equation.

The supply elasticity in all states except West Bengal ranges from 0.58 (Uttar Pradesh) to 0.74 (Maharashtra). The supply elasticity for West Bengal has been abnormally low and is not significant at even 10 per cent. The estimated supply equation for West Bengal is not robust logically, even though it appears to be so statistically. Unfortunately, supply elasticity with respect to price is not significant.[23] The supply elasticity for West Bengal has been assumed close to the one for Uttar Pradesh, since this is the lowest supply elasticity

estimate among the above states and in West Bengal an insignificant milk supply elasticity with respect to price in fact indicates that price has less effect on milk supply.

The demand for milk (MILDD) in various states is supposed to be influenced by the price of milk (MILPRICE), price of competing goods like pulse (PULSPR) and per capita income (PCI). The demand for milk in the present analysis is the per capita availability of milk arrived at from the aggregate data at the state level. Unlike supply, demand for milk is supposed to be influenced by the current prices of milk. The prices of the commodities and per capita income have been deflated with the income deflator as obtained from the Development and Planning Centre of the Institute of Economic Growth. Estimated demand equations for the five states Haryana (H), Maharashtra (M), Tamilnadu (T), West Bengal (W) and Uttar Pradesh (U) have been presented below:

$$\underset{(3.49)}{MILDDH} = 5.49 - \underset{(0.26)}{0.45^{*}}\ MILPRICE + \underset{(0.13)}{1.42^{**}}PCI + \underset{(0.13)}{0.01}\ PULSPR \qquad (R^2 = 0.92)$$

$$\underset{(3.49)}{MILDDM} = 9.07 - \underset{(0.29)}{0.47^{*}}\ MILPRICE + \underset{(0.34)}{1.79^{**}}PCI + \underset{(0.15)}{0.17^{*}}\ PULSPR \qquad (R^2 = 0.94)$$

$$\underset{(3.49)}{MILDDT} = 11.54 - \underset{(0.27)}{0.44^{*}}\ MILPRICE + \underset{(0.48)}{1.06^{**}}PCI + \underset{(0.14)}{0.16}\ PULSPR \qquad (R^2 = 0.88)$$

$$\underset{(2.86)}{MILDDW} = 18.06 - \underset{(0.23)}{0.27}\ MILPRICE + \underset{(0.31)}{1.29^{**}}PCI + \underset{(0.35)}{0.10}\ PULSPR \qquad (R^2 = 0.84)$$

$$\underset{(3.49)}{MILDDU} = 3.17 - \underset{(0.21)}{0.36^{*}}\ MILPRICE + \underset{(0.12)}{1.45^{**}}PCI + \underset{(0.13)}{0.02}\ PULSPR \qquad (R^2 = 0.94)$$

***Note*:** The demand for milk in the states of Maharashtra, Tamilnadu, Uttar Pradesh, West Bengal, Haryana has been presented with the equations MILDDM, MILDDT, MILDDU, MILDDW, and MILDDH. The above equations also present elasticity of milk demand with respect to milk and pulse prices (MILPRICE, PULSPR) and also per capita income (PCI). As explained earlier the strength of the elasticity coefficients has been presented with the asterisks ((asterisk (*) and (**) indicates significance at 10 and 1 per cent level respectively)), standard errors associated with the individual estimate have been presented in the parentheses just below the estimates. As in the estimated supply equations, the coefficient of determination (R^2) adjusted with the degree of freedom has been presented in parentheses in the same row as that of the estimated equation.

The signs of variables in these estimated equations are as per expectation. The price of milk carries a negative sign while that of substitutes like pulse, the sign is positive. Per capita income has a positive sign in all the estimated equations, the income elasticity coefficients range from 1.06 to 1.79 for the selected states of the country, and these estimates are also highly significant (at 1 per cent). The estimates for price elasticity of demand for

milk ranges from 0.27 (West Bengal), 0.47 (Maharashtra), and 0.36, 0.44 and 0.45 for Uttar Pradesh, Tamilnadu and Haryana, respectively. These coefficients were significant at 10 per cent only. The elasticity coefficients with respect to the price of pulse are not significant for most of the states. The price elasticity coefficient for West Bengal has been assumed similar to the elasticity estimate of UP for future analysis. The milk supply and demand elasticity with respect to price considered for the present analysis has been presented below in Box 3.2.

The above estimated equations indicate that per capita income has been the most important determinant for milk demand followed by the price of milk. Whereas in the supply of milk, milk price is the most important determinant, although the other two determinants namely agricultural performance, and oilcake price also influences supply of milk. With these estimates for supply and demand elasticity the present analysis attempts to work out producer's and consumer's benefits following free imports of milk products in the country.

Box 3.2: Supply and Demand Elasticity with Respect to Price for Important States

States	Supply Elasticity	Demand Elasticity
Haryana	0.68	-0.45
Maharashtra	0.74	-0.47
Tamilnadu	0.61	-0.44
West Bengal	0.58 (0.40)	-0.36 (-0.27)
Uttar Pradesh	0.58	-0.36

II.4 Producer's and Consumer's Surplus

The implications of changes in domestic prices will be different for the producers and consumers of milk products, though there is a possibility of a trade-off between their interests. An attempt has been made in this section to quantify the benefits accruing to the producers and consumers of milk products as a result of import liberalization (see Table 3.2). The quantum of benefits would depend on the import parity prices or international reference price and supply and demand elasticity of milk products with respect to price.

A previous table indicates that import of milk products at a low international price (Rs.640 per quintal) has led to a steep decline in the domestic prices of milk and since supply of milk is highly price elastic, this means that a fall in the producers' prices of milk has resulted in a fall in the supply of milk in all the states chosen for the present analysis. This

decline in supply of milk is being transformed into a negative producer's surplus in all the states. The magnitude of negative surplus varies across states; this has been the highest in Uttar Pradesh, followed by Maharashtra, Tamilnadu, Haryana and West Bengal. As discussed earlier a fall in prices in the wholesale markets will encourage consumers to consume more milk since demand for milk is also price elastic. This has led to an increase in the consumer surpluses. Increase in consumers' surpluses has also been at the maximum for Uttar Pradesh, followed by Maharashtra, Tamilnadu, West Bengal and Haryana. A comparison of these states indicates an alteration in orders between West Bengal and Haryana. The changes in the order of these two states highlights the differential impact of free-import on milk production and consumption in the two states of Haryana and West Bengal on account of the low supply elasticity in West Bengal and a relatively higher price of imported milk products in Haryana.

The changes in total surpluses are an aggregation of changes in producer's and consumer's surpluses. The positive net surplus in all the states suggests that the benefits to consumers outweigh the losses to the producers. The amount of net surpluses is the maximum for Uttar Pradesh followed by figure for the other states. This encourages the researcher to factor out the effect of size from these surpluses by dividing this by the state milk production. This has been referred to here as a unit surplus, which tells us about the actual trend in producers' consumers' and net surpluses across the states and one can discern some interesting trends from this. Decline in per unit producers' surpluses have been the maximum for Maharashtra followed by Tamilnadu, West Bengal, Haryana and Uttar Pradesh. Whereas consumer's surplus per unit of milk production has been the maximum for Maharashtra followed by West Bengal, Tamilnadu, Haryana and Uttar Pradesh. A comparison of producer's and consumer's surpluses per quintal of milk production suggests small changes in the order of the states of West Bengal and Tamilnadu. This change in order implies that a negative impact on milk production will be lesser in West Bengal as compared to Tamilnadu because of a difference in the supply elasticity in these states. In general the impact of import has been greater in the coastal states as compared to other states of the country.

The above exercise about assessing the producer's and consumers' benefits were based on a specific situation when the international price was as low as Rs 645 per quintal. In

the international market, equivalent milk prices are often Rs.850 per quintal. In the present analysis this has been considered as the intermediate range of world price. At this range of world price, the DDP price at one of the Indian ports would be Rs.1204 per quintal, price differences in the wholesale market suggests that import would take place only in Mumbai, and the effect on producers and consumers would be restricted to Maharashtra only. The producers and consumers in the other four states would by and large remain unaffected.

Table 3.2: Impact of Free Import of Milk on Producers, Consumers and Net Social Welfare in Selected States of India with Different Range of World Prices in the Year 1999

Particulars	Low range of World Price (Rs. 640 per quintal)					Intermediate (Rs. 850 per qtl.)	
	Haryana	Maha rashtra	Tamil nadu	West Bengal	Uttar Pradesh	Maha rashtra	Other states
Production in mil qntl	46.8	57.1	45.7	34.7	141.5	57.1	
Producers price: existing	1030	1090	995	1020	960	1090	
Producers price: free trade	824	750	734	759	788	1073	
Supply elasticity with price	0.68	0.74	0.61	0.52	0.58	0.74	
Supply - existing	46.8	57.1	45.7	34.7	141.5	57.1	
Supply under free trade	40.4	43.9	38.4	29.5	126.8	56.5	No Change
Changes in producers surplus	-8985	-17155	-10981	-8388	-23019	-965.10	
Unit change in producers surplus	-213	-300	-240	-231	-166	-16.9	
Aggregate demand	42.1	57.1	45.7	36.3	138.7	57.1	
Wholesale price: existing	1225	1300	1200	1250	1175	1300	
Wholesale price under free trade	980	895	885	930	965	1280	
Price elasticity of demand	-0.45	-0.47	-0.44	-0.36	-0.36	-0.47	
Existing demand	42.1	57.1	45.7	36.3	138.7	57.1	
Demand under free trade	45.8	65.4	50.9	39.6	147.6	57.4	No Change
Change in consumer's surplus	10779	24819	15227	12151	30064	1146	
Unit change in consumer's surplus	256	435	333	335	217	20.1	
Change in total surplus / welfare	1793	7663	4246	3763	7045	181	
Employment (change in million mandays)	-35.7	-76.2	-42.1	-26.5	-84.8	-3.5	
Forex (change in million $US)	-56.8	-125.4	-79.2	-50.2	-133.9	-8.3	

The world prices are at times as high as Rs. 1140 per quintal (at fob USA). At this range of world price, the DDP price at Indian port would be Rs.1425 per quintal. The ex-port price is significantly higher than the domestic prices; therefore, chances of imports at such a

high price are less. There are in fact possibilities of exports when the milk equivalent price in the world market is so high. This however cannot be inferred with confidence since differences in the world price and price in the domestic market is not so high as to indicate a strong chance of exports from the country. Even if there were exports this will be to some neighbouring countries where India has some definite advantage in freight as compared to other important milk products exporters. The effect of exports for producers and consumers of milk products will be entirely different since exports in general increase the domestic price. However, a proper analysis of the same is not possible, as statistics do not suggest the definite possibility of exports. In reality also, exports of milk products fluctuate and are generally to the neighbouring countries.

The above analysis presents a trade off between the producer's and consumer's interest, and establishes that imports are generally to benefit consumers. The increased benefit to consumers following free import may be assessed with some caution. First, the amount of consumers' benefits has been over-estimated because of the simplistic assumption of a perfectly inelastic world milk price. In actual fact, demand for milk products from India because of lower prices under a free trade regime will be very high.[24] The world price for milk products is bound to increase with such a high demand for milk products from India. Consequently, the gain to consumers will be subsided. Increase in consumer's surplus and total welfare has also been overestimated since import requires a draining of foreign exchange, though this may not be that important presently on account of a burgeoning foreign exchange reserve in the country. An attempt has however been made in the present study to quantify the draining of foreign exchange as demand for milk products increases with the import liberalization. The last row in Table 3.2 shows the draining of foreign exchange in the states in different scenarios.

Similarly, losses to the producers also need to be understood properly. Milk producers in India in terms of scale of production are not properly integrated with the wholesale market. This is evident from the low share of producers in the wholesale price of milk in the chosen states of the country. The above analysis shows that consequent to imports the total social welfare has increased, as a decrease in producer's surplus has been overcompensated by the increase in consumer's surplus. The decrease in producers' surplus has been underestimated

in the sense that it ignores loss in employment because of decline in milk production, and the wide ramification that this decline in employment has for other sectors of the economy.

Table 3.3: Impact of Free Imports on Domestic Prices and Aggregate Welfare in Selected States of India with Different Range of World Prices (A Summary Table)

World Price	States	DDP Price	Domestic Price (DP)		Change in DP over Reference Price		Unit Change in Surplus		Employment Million Man Days
			WP	PP	in WP	in PP	Producer	Consumer	
Low range (Rs.640/ qntl)	Haryana	----	1225	1030	-20.0	-25.0	-213	256	35.7
	M'rashtra	810	1300	1090	-31.2	-45.2	-300	435	76.2
	T'nadu	810	1200	995	-26.3	-35.6	-240	333	42.1
	Wbengal	810	1250	1020	-25.6	-34.4	-231	335	26.5
	UPradesh	----	1175	960	-17.9	-21.7	-166	217	84.8
Medm (Rs.850/ qntl)	M'rashtra	1204	1300	1090	-1.5	-1.6	-17	20.1	3.5
	Other	1204	1175-1250	960-1090	No change since trade not possible				
High (Rs.1140/ qntl)	Mah,Har	1425	1225-1300	No change since trade not possible					No change
	TN,WB,UP	1425	1175-1250	Chances of exports but uncertain					

The present analysis therefore, attempts to assess the effect of import liberalization on employment. There is a dearth of literature on employment relating to the physical output of milk in the country. The present study after comparing the available primary and secondary information relating to milk production and employment concludes that the production of one quintal of milk output generates 5.8 mandays of employment in the country (for details Appendix IIIb). The effect on employment will be realized because of a decline in milk production. The loss in employment has therefore been arrived at by multiplying decline in milk production with employment coefficient (5.8 mandays). Allowing free import at a low range of world price causes a significant loss of employment, ranging from 26.6 million mandays in West Bengal to 84.8 million mandays in Uttar Pradesh. In the intermediate range of world prices, the loss of employment following imports is very much lesser, as is clear from the above analysis. Implications of imports are for the state of Maharashtra only and the loss of employment is around 3.46 million mandays in the state.

III.5 Conclusions

In India, the real price of milk in the country shows a decreasing trend after the year 1993. This decline in the price of milk would affect different constituents of the dairy sector in different ways. This has been quantified by adopting the economic surplus approach. These analyses indicate that when the world price is low (milk equivalent price US$640 per quintal) the doctrine of free import would cause a high level of imports of milk products in the country. This will increase consumers' welfare. This increase is significantly higher than the losses to the producer resulting in an increase in total welfare. The implications of imports have in general been stronger for the coastal states as compared to the land-locked states of the country. The increase in welfare may however, be inferred with some caution since this assumes that world price is inelastic to India's demand for milk products. The economic surplus approach also ignores loss of employment as a result of decline in milk production following import liberalization.

Appendix III
A. The Economic Surplus Approach

The benefit to producers and consumers following free import of milk products has been analysed with the economic surplus approach. The concept of economic surplus is a century old, it was introduced by Dupit and later popularized by Marshall and Hicks. This has been applied to a range of problems; for example in agriculture Akino and Hayami (1975) assessed social returns to investment in agricultural research, more recently Ramesh Chand (1999) has used it for assessing implications of trade liberalization for Indian agriculture. The present study uses this approach for assessing the implications of import liberalization for the Indian dairy sector. This economic surplus approach is based on the fact that imports will affect the domestic prices; reduction in domestic price would affect the quantity demanded of the commodity. The change in the quantity demand will affect consumers' surplus. The supply of the commodity cannot be increased in the short run since short run supply elasticity for milk will be extremely low; therefore, a decline in the price of the commodity without a shift in the domestic supply function would adversely affect the producers' surplus.

The total economic surpluses will be an aggregation of producer's and consumer's surpluses. The producers and consumers surpluses can be explained with the graphical exposition, the non-unitary elasticity of supply and demand however, creates problems in the measurement of geometric area; therefore, this has been explained with simple algebraic notations.

Let us assume that in the existing situation, the producer's price is PP1, the quantity supplied by the producer at the PP1 price is QS1; the consumer's price in the present exercise is the wholesale price, WP1 and quantity demanded at the existing wholesale price is QD1. Following free import of milk products, the new producer's price is PP2, quantity supplied at this price is QS2, consumer's price is WP2 and quantity demanded at the corresponding price is QD2. The effect of price on supply and demand will depend on the supply and demand elasticties, let this be SE and DE, respectively. With these notations various estimates presented in the Table 3.2 have been obtained from the following expressions:

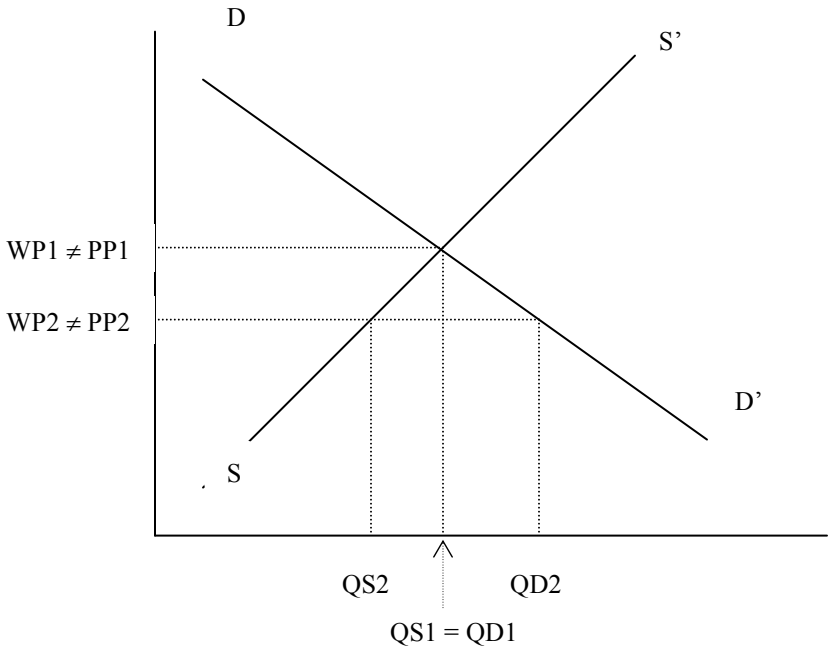


Figure: The Economic Surplus

In the above figure wholesale price (WP) and producer price (PP) are same but in actual these prices in a region is different. The changes in producers and consumers surplus following imports in the above figure has been presented below:

Changes in producer's surplus: (PP2-PP1) (QS1 + (QS2 - QS1)/2)
Change in consumer's surplus: (WP1-WP2) (QD1 + (QD2 – QD1)/2)
All notations have been explained above.

The change in producer's surplus due to imports has been obtained from: (PP2-PP1)(QS1+(QS2-QS1)/2) when QS1 and PP1 is given; PP2 has been calculated from PP1 by adjusting this as per the changes in the wholesale price following imports, and QS2 at PP2 will be: QS1 + QS1(SE*(PP2-PP1)/PP1).

The change in consumer's surplus due to free import has been calculated from: (WP1-WP2) (QD1 + (QD2 – QD1)/2), when WP1, WP2 and QD1 is given and QD2 at the WP2 price will be: QD1 + QD1(DE*(WP2 – WP1)/ WP1).

Net Social Gain or Total / Aggregate Surpluses = Change in Producers Surpluses + Change in Consumer's Surpluses.

Appendix III
B. Note on Employment Estimate

The authors did not find any published estimate linking milk output with the number of persons employed. An attempt has therefore been made in the present study to arrive at some reliable estimate for the same. Primary data collected by the present investigator during his Ph. D. theses research revealed that in a typical village herd, one milch animal (average of buffaloe, cross-bred and desi cows) during a calendar year provides on an average 12.5 quintal of milk and employs 66 man days of labour. One quintal of milk thus generates 5.5 mandays of employment in the Kurukshetra district of Haryana.

The secondary information also provides similar estimates. Thus the NSSO employment figure at the aggregate level on the basis of current daily status (CDS) shows that employment in the livestock sector was 16.5 million person year during the year 1999-2000. If we assume that share of milk and milk products in total livestock employment is as per its share in the value of output, employment in milk and milk products would have been around 12 million person year. The milk output during the year was 731 million quintal; therefore employment created for producing one quintal of milk has been around 5.8 man days at the all India level.

A relatively higher employment figure from secondary information as compared to primary data is conceivable since the primary data pertains to a high productivity region, whereas the secondary information at the all India level is the average of high as well as low productivity regions of the country. The present study thus assumes that one quintal of milk production generates 5.8 mandays of employment. This estimate has been assumed to be uniform for all the selected states of the country namely Haryana, Maharashtra, Tamilnadu, West Bengal and Uttar Pradesh.

IV
Conclusions and Policy Directions

In India, the growth of dairy during the last three decades has been impressive, at more than five per cent per annum. For a majority of the sates the compound growth has been more than four per cent; Rajasthan, Bihar, Orissa and the seven-sister states of the North-east were exceptions. A favourable price environment for milk producers following the replication and strengthening of the cooperative network is supposed to have influenced this spectacular growth in the dairy sector. The favourable price environment however, appears to have been weakening in the globalizing world. The price-based support beyond a limit is not tenable in the emerging trade order. Against this backdrop, the present study assesses the dairy sector of the country in a liberalizing world.

The present study found that the world dairy market especially the export market is highly concentrated with New Zealand, EU, Australia and the US forming the major sources of milk products. Most of the important players in the world dairy market are members of the WTO; therefore, WTO Agreements can influence the world trade in milk products. A review of trade statistics during the WTO implementation period suggests that there has not been a significant increase in the world trade for milk products, though there has been a marginal increase in the trade in milk powders and cheese. Various neo-protectionist measures adopted by several WTO member countries have restricted trade expansion.

The countries often protect their primary commodities by manipulating prices. However protection coefficients calculate the magnitude of price distortions. The protection coefficients suggest that the US in spite of its low price efficiency as compared to New Zealand has been exporting milk products obviously through hefty export subsidies. The NPCs in EU declined for most of the milk products during the reference period (1995-96 and 2001-2002); in fact the EU countries under the Common Agricultural Policy (CAP) have resorted to income-based supports, which has been decoupled from production to make it WTO-compatible. The WTO agreements ignore various types of trade-distorting income support.

There have been various other ways of protecting the domestic market by violating and circumventing the WTO Agreements. In agriculture, the mode of distorting the world

market in general varies with the stage of development of the country. Developed countries in general provide export subsidies and income-based supports to their producers while developing countries are protecting the interests of their producers by erecting high tariff walls. The perception about establishing fair trade in agriculture therefore varies across countries. Harbinson's draft attempts to compromise the interests of the developing and developed countries and elaborates the road map for trade liberalization in agriculture.

Though India exports certain milk products, the country has been a net importer of milk products in most of the years. The protection coefficients for milk products suggest that milk products are protected in most of the years; a decreasing trend in the level of protection is however, evident since the late 90s. A comparison of the real prices of milk with other related products like meat and oilcakes indicates that the real price of milk, unlike meat and oilcakes decreased during the 90s. One must note that meat and oilcakes are exportables, while milk/ milk products are largely the importable item for India. Imports therefore appear to have helped in the reduction of real price since there have been no major changes in the other determinants for the real price of milk. It is interesting to note that even though milk products in India are protected a decreasing trend in the protection of milk products in the 90s has led to decline in the real price of milk in the country.

The likely implications of decrease in the real price of milk will be realized by the producers and consumers of milk and milk products; the extent of this implication will be realized by changes in the prices of milk at different levels of the market. The present study has therefore, worked out the impact of import of milk products on the domestic price of milk. As the world trade in milk is limited, the world price for milk has therefore been derived from the prices of milk powders, since this is the most important milk product from India's import perspective. The world prices for most of the milk products vary widely. In the last few years, the lower range of prices for whole milk powder has been US$1500 per MT *f.o.b* at New Zealand, the higher range of the international price has been US$2650 per MT *f.o.b* at US, an intermediate range of the international price US$2050 per MT *f.o.b*. prevailed in both the countries. The world price (*f.o.b*) of milk in these extreme scenarios will be Rs.647 (low), Rs.884 (intermediate) and Rs.1140 (high) per quintal (*f.o.b*). Imports at these extreme world prices would have a different effect on domestic markets at different

levels, at ex-port (Delivered Duty Paid price or DDP Price), wholesale market (wholesale prices) and the producers' level (producers price) across the countries.

Allowing free import at a low price that is Rs 647 per quintal (*f.o.b*) will dampen domestic prices at all levels. A comparison of these reference prices with the existing domestic prices in the respective wholesale markets indicates how significantly higher the prices in the wholesale markets are than the reference price. This difference in price is highest in Mumbai followed by the Chennai, Kolkata, Delhi and Kanpur markets. This trend suggests that effect of import on the wholesale markets is strong in the coastal regions, or in other words in markets closer to the port. A lowering of the wholesale prices in these markets following imports will also be transferred at the producers level.

Changes in the domestic price of milk at different stages of marketing would affect production as well as consumption of milk in the country. The quantification of this effect on production and consumption would depend on the supply and demand elasticity of milk with respect to its prices. There is a dearth of reliable estimates for milk supply elasticity with respect to price; an attempt has therefore been made in the present study to workout supply elasticity. This ranges between 0.58 (Uttar Pradesh) to 0.74 (Maharashtra) in the referred states. In the demand equation per capita income appears to be more important than the price of milk on the basis of the level of significance; income elasticity coefficients range from 0.96 to 1.79 for the chosen states, while price elasticity of demand for milk ranges from 0.36 (Uttar Pradesh) to 0.47 (Maharashtra).

Since supply of milk is highly price elastic, a fall in the producers' price of milk following free import at the lower range of the world price has resulted in a drastic reduction in supply of milk in all the selected states. The magnitude of reduction in milk supply for these states varies depending on the amount of changes in the prices and also elasticity of supply with respect to prices. This decline in supply of milk has led to a negative producer's surplus in all the states. As discussed earlier a fall in the wholesale price will encourage consumers to consume more milk, as milk consumption is also price elastic; and consumers' surplus would increase. The increase in consumers' surplus is significantly higher than the losses to the producers so that economic surplus has increased in all the states. In general, the impact of import has been greater in the coastal states of the country.

The above analysis is based on a scenario where the world price for milk products is low. A similar analysis has been carried out for an intermediate range of world prices, which in the present analysis is Rs.850 per quintal (fob). A comparison of this hypothetical price with the existing prices in the wholesale markets suggest that there is possibility of import in Mumbai only and the effect of this limited import will be confined to the state of Maharashtra. The present study attempts to simulate a situation with a high world price at Rs. 1140 per quintal (*f.o.b*). This results in a still higher ex-port price (Rs.1425 per quintal) and milk prices in domestic markets at all levels are lower than the above price negating the possibility of imports in the country.

The present study thus shows the possibility of large imports when the world price is low. At this range of world price, the total social welfare has increased, since a decrease in producer's surplus has been overcompensated by the increase in consumer's surplus. The increased benefits to consumers following large-scale import may be inferred with some caution; the consumers' benefits have been over-estimated because of the simplistic assumption of a perfectly inelastic world milk price. The decrease in producers' surplus has been underestimated in the sense that it ignores loss of employment because of a decline in milk production. The present study estimates a significant loss of employment ranging from 26.6 million days in West Bengal to 84.8 million days in Uttar Pradesh following import at a low range of world price. This decline in employment may have wide ramifications for the economy since employment in the dairy sector is largely associated with the livelihood of the rural poor in the country.

It may be noted that milk products in the country are protected while prices of milk in the country are one of the lowest in the world. This difference in the levels of protection apart from highlighting processing inefficiency also suggests a structural problem in the domestic milk marketing system. Some of the problems in this are the presence of a large number of producers with lesser marketed surplus, and the high cost of milk collection for the processing units. Improvement in these aspects is a slow process and would require significant time. The international pressure for reducing import tariff however ignores this reality. The tackling of an eventuality as that of imports at a low world price therefore requires proper strategies for the domestic and external fronts as well.

In last few years the government has undertaken a few important steps to evolve a vibrant dairy sector in the country. The company law has been amended. The MMPO has been diluted to incorporate concerns related to the quality of milk products. The Tenth Five Year Plan has made significant allocations for improvement in the milk quality related infrastructure in the country. Yet, a lot needs to be done, as the dairy sector in spite of its importance for the livelihood of millions of poor lacks an effective price or income-based support. Government support has been there in the form of various dairy development programmes, and the creation and maintenance of infrastructure related to dairy. However, the level of this support is not only low (around 0.2 per cent of the central plan expenditures in recent plan periods) but it is also inefficient[25]. In dairy, there is hardly any price or income-based support. The latter type of support however needs to be identified in the new trade order. One can dispute this suggestion on account of fiscal pressures; but the importance of dairy enterprises for the sustenance of rural income needs to be recognized, and some resource transfer for this sector is desired.

On the trade front also the Government has taken a few measures towards the end of the 1990s. The bound rates of zero per cent on skim milk powder have been re-negotiated and now this attracts TRQ with an import tariff of 15 per cent for in-quota and 60 per cent for imports beyond quota. The trade policy in a globalizing world, however, needs to be updated on a continuous basis. Some of the elements of an updated trade strategy that can provide a favourable environment for dairy development in the country have been mentioned below.

Following the pre-review negotiation of bound rates there is not much scope for playing with the import tariff for milk products. In the review of the AoA, which is going on, India can revoke the special safeguard clause. This clause offers a great deal of flexibility to the importing countries.

The present study clearly shows a decrease in the real prices of milk. On this account the country can also articulate a case for antidumping and countervailing duty against the EU. However, considering the manner in which the EU has changed its domestic policy by shifting its support from price to income, it is difficult to enforce the countervailing duty. In a developing country like India, the nominal price of a commodity rarely decreases; the price criteria of antidumping therefore may be evaluated with the real prices rather than the nominal price in India.

The WTO Agreements require a gradual reduction of tariff, and the developed countries are in fact pressing for this action. Harbinson's draft also calls for an effective reduction of tariff with a differential rate for high, intermediate and low tariff commodities. This draft under its strategic product concept recognizes the importance of a specific commodity for a country. This draft also recognizes the importance of protecting the small family farm in the developing country. The dairy sector in India is predominantly characterized as a small family farm, and the milk production is subsistence in nature. On these grounds, India can postpone the reduction of tariff for dairy commodities. The present rate of tariff appears to provide sufficient protection to the milk products in the country. This essentially follows from the present analysis with the intermediate range of world price, the difference between the low and high range of world prices (around 30 per cent) and the existing applied tariff for milk products in the country (around 35 per cent).

With these arguments one must not perceive that the Indian dairy sector requires protection. It can survive competition but the competition has to be fair and in several ways since the world trade in milk products is not fair the measures enlisted above are necessary. These measures are all the more important since dairy is associated with the fate of millions of poor in the country.

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Annexure Tables

Table A1: Distribution of Selected Livestock and Agricultural Holdings in India

Category of land holding	Number of holdings (000)	Operated area (000 ha)	Cattle – Males (millions)	Cattle – Females (millions)	Buffaloes – Males (millions)	Buffaloes – Females (millions)	Sheep & Goat (millions)
Marginal (below 1.0 ha)	56610 (57.1)	24071 (15.3)	38.2 (33.9)	36.6 (36.5)	8.7 (36.3)	24.4 (33.8)	50.0 (41.7)
Small (1.0 to 1.9 ha)	20103 (20.3)	28540 (18.1)	28.3 (25.0)	23.1 (23.0)	5.3 (22.1)	16.2 (22.5)	27.5 (22.9)
Semi-medium (2.0 to 3.9 ha)	13589 (13.7)	37187 (23.6)	24.2 (21.5)	20.7 (20.7)	5.1 (21.3)	15.6 (21.7)	21.3 (17.7)
Medium (4.0 to 9.9 ha)	7217 (7.3)	42684 (27.1)	17.4 (15.4)	15.1 (15.1)	3.8 (15.7)	12.2 (16.9)	14.9 (12.4)
Large (10.0 ha & above)	1543 (1.6	25077 (15.9)	4.7 (4.2)	4.7 (4.7)	1.1 (4.6)	3.7 (5.1)	6.3 (5.3)
All size classes	99062 (100.0)	157559 (100.0)	112.8	100.3	24.0	72.0	120

Note: The figures in parentheses indicates proportion of respective group in total holdings/ population

Table A2: Contribution of Agriculture and Livestock in Income and employment during the 80s and 90s

Years	Per cent in GDP		Proportion in total employment	
	Agriculture	Livestock	Agriculture	Livestock
1983	34.7	4.8	66.3	4.5
1987-88	28.3	6.2	63.9	4.3
1993-94	28.4	6.5	62.5	3.0
1999-'00	24.9	5.5	57.4	4.9

Note: The distribution of livestock sector outputs during the year 1999-2000 with their share in the parentheses are milk (68 per cent), meat (17 per cent), eggs (3 per cent), honey inclusive of silk (1 per cent), dung obtained from various livestock (8 per cent), livestock inventory (3 per cent).
Source: Dairy India 1997

Annexure Table A3: Historical Trends in Bovine Population of India

in million numbers

Categories	1951	1961	1972	1982	1992	1997
A . **Cattle**						
Females in milk	18.96	20.72	22.03	26.59	31.56	
Females dry & not calved	27.41	30.29	31.38	32.10	31.12	
Other females	3.50	3.31	2.99	0.51	1.67	
Males for Breeding	0.65	0.38	0.39	11.53	10.22	
Males working (bullock)	58.47	68.60	70.57	61.05	54.98	
Males for Breeding & work	--	1.98	1.99	2.05	8.24	
Other males	2.68	1.52	1.51	1.61	1.04	
Young stocks male & female	43.56	48.87	47.48	56.99	65.75	
Cattle- Grand Total	155.24	175.67	178.34	192.45	204.58	
B. **Buffaloes**						
Females in milk	10.22	12.58	15.07	17.99	25.87	
Females dry & not calved	10.79	11.66	13.54	14.40	16.59	
Other buffaloes	0.85	0.79	0.63	0.12	0.62	
Males for breeding	0.31	0.29	0.22	0.63	0.52	
Males for work purpose	6.03	6.61	7.01	5.97	5.01	
Males for Breeding & Work	--	0.51	0.60	5.97	2.35	
Other males	0.46	0.26	0.23	1.35	0.21	
Young stocks male & female	14.75	18.45	20.12	44.72	32.32	
Buffaloes - Grand Total	43.41	51.15	57.42	69.78	83.50	
C **Structural Changes in Populn.**						
Cows in milk as % of br'dble female	40.88	40.61	41.24	45.30	50.35	
Breedable Cow as % of total popln.	29.8	29.0	29.90	30.50	30.64	
Young stock as % br'dble female	93.94	85.80	88.90	97.10	104.87	
Buffaloes in milk as % of br'dble emale	48.64	51.89	52.67	55.57	59.97	
Breedable buff. as % of total popln.	48.4	47.4	48.9	46.4	51.28	
Young stock as % br'dble female	76.9	76.11	70.32	76.32	74.84	

Source: Livestock Census of different years/ periods; unfortunately Livestock Census for the year 1997 is not yet available for public.

Table A4: Index Numbers of Wholesale Price Indices of Milk and Other Related Commodities during Selected Years

Items	1984-85	1990-91	1992-93	1999-2000	AAGR-I period	AAGR-II period
All Commodities	120.1	182.7	228.7	363.1	7.8	6.5
Food article	131.8	200.6	271.0	457.7	8.6	7.3
Milk	132.6	209.2	264.8	403.2	8.3	5.9
SMP	120.4	178.6	289.9	385.6	10.3	4.0
Butter	122.8	216.7	262.6	452.1	9.1	7.6
Ghee	130.1	188.7	239.1	400.4	7.4	7.2
Mutton	126.2	219.0	275.1	581.9	9.3	10.2
Cattle Feed	111.0	155.0	195.8	335.5	6.9	7.5

Table A5: Some Indicators for Dairy Development State-wise, 1999

Sl. No. States / Uts	Milk Prodn. (000 tonnes)	Per Capita Availability (gm/day)	Bovine Milch Popln. (000nos)	Proportion of buffalo in bovine milch popln	Crossbred to other milch cow ppln. (%)
1 Andhra Pradesh	4842	179	6933	64.4	9.8
2 Arun'al Pradesh	45	110	56.1	-	37.4
3 Assam	725	78	2616	7.84	7.1
4 Bihar	3440	97	9540	33.47	3.1
5 Goa	41	74	-	-	-
6 Gujarat	5059	294	5516	60.24	6.5
7 Haryana	4527	641	3195	79.84	42.8
8 Him'al Pradesh	724	309	1173	40.41	24.4
9 Jammu & Kas'r	1232	354	-	-	-
10 Karnataka	4231	227	5882	38.51	17.6
11 Kerala	2420	209	1674	3.0	306
12 Madhya Pr'sh	5442	193	12847	36.39	2.51
13 Maharashtra	5609	172	6475	44.80	27.7
14 Manipur	65	75	147	15.65	21.5
15 Meghalaya	61	72	208.1	5.66	7.3
16 Mizoram	20	61	38	-	18.4
17 Nagaland	48	82	-	-	-
18 Orissa	733	57	4539.6	8.86	8.3
19 Punjab	7394	877	4833	74.9	264.3
20 Rajasthan	6923	365	8974	49.7	1.1
21 Sikkim	35	179	-	-	-
22 Tamil Nadu	4273	192	4983	38.87	40.6
23 Tripura	76	58	-	-	-
24 Uttar Pradesh	13618	227	16717	59.16	10.6
25 West Bengal	3441	122	5555	3.89	10.6
26 A & N Islands	22	165	38	21.05	11.1
27 Chandigarh	43	140	21.4	79.38	764.7
28 Daman & Diu	8	166	-	-	-
29 D & N Haveli	1	21	-	-	-
30 Delhi	290	61	158	79.11	-
31 Lakshadweep	2	95	0.83	-	53.7
32 Pondichery	36	61	34	5.88	966.7
All India	75424	213	102154	43.80	14.3

Table A6: Profile of Major Milk Producing Countries of the World 1996-7

Countries	Per capita availability* (gms/day)	Milk Production (million MT)	Milk Yield of cattle per year (kg/animal/year)
New Zealand	8498	11.29	3414
Denmark	2432	4.66	6716
Australia	1455	9.69	4547
Canada	705	7.70	6160
USA	719	71.26	7767
UK	687	14.65	5680
Turkey	440	10.08	1586
Pakistan	420	22.04	1035
Mexico	250	8.62	1245
Israel	550	1.16	8615
India	214	75.00	1415

Note: Data for per capita availability of milk and milk products is available for the year 1997 and the source for the same is Basic Animal Husbandry Statistics 2002, whereas milk yield for most of the countries are for the year 1995/6 and source is FAO Production Year Book, 1998.

Table A7: Trade Policy Status for Major Dairy Products in India

Commodity (HS Code)	Import Tariff		Comparison of Trade Policy Status			
	WTO bound rate	Basic March 2003	Exports 1991	Imports 1991	Exports 2003	Import 2003
Milk and cream (0401)	100	35	Restricted	Restricted	Free	Free
Powdered milk (0402.10/.21)	60	15, 60*	Canalized	Restricted	Free	Free
Powdered milk (0402.91-.99)	40	30	Canalized	Restricted	Free	Free
Yogurt et. (0403)	150	35	Canalized	Restricted	Free	Free
Whey etc (0404)	40-150	30	Canalized	Restricted	Free	Free
Butter etc (0405)	40	40	Canalized	Restricted	Free	Free
Cheese (0406)	40	30-40	Canalized	Restricted	Free	Free

Note: Asterisk (*) shows tariff rate for out-quota (beyond 10000 tonnes). Import tariff for most of the milk products was 100 per cent during the base period.

Table A8: Harmonised System (HS) codes Related to Dairy and its Description

HS Code	Description of the commodity
0401	Milk and cream not concentrated nor containing added sugar or other sweetening matter
0402	Milk and cream concentrated or containing added sugar or other sweetening matter
0403	Butter milk, curdled milk or cream, yogurt, kephir and other fermented or acidified milk or cream whether or not concentrated or containing added sugar or other sweetening matter or flavoured or containing added fruits, nuts or cocoa
0404	Whey, whether or not concentrated or containing added sugar or other sweetening matter, products consisting of natural milk constitutents, whether or not containing added sugar or other sweetening matter not elsewhere specified or included
0405	Butter and other fats or oils derived from milk
0406	Cheese and curd

Endnotes

[1] In India small and marginal farmers accounting for around 77 per cent of total holdings cultivates only 33 per cent of operated area; they however accounts for around 60 per cent of female cattle and 56 per cent of female buffaloes in the country (Annexure Table 1).

[2] In the '80s and '90s share of livestock in GDP has been increasing while that of agriculture was decreasing during the same period; the share of livestock however declined during the recent period. A large part of the livestock output is essentially dairy (Annexure Table 2).

[3] In the year 1999-2000 milk production in India surpassed milk production of 76 million tones in US. The US used to be the highest milk producing country of the world (*Source*: Basic Animal Husbandry Statistics, Department of Animal Husbandry and Dairying, MoA, GOI).

[4] Harbinson's draft, which to some extent is a compromise between the conflicting interests of the developed and developing countries, is widely recognized as a benchmark for future negotiations on agriculture. This draft recognizes importance of strategic product for a developing country.

[5] Towards the end of the 90s milk production in India surpassed milk production in US (76 million tones).

[6] Milk and milk based products account for 16-17 per cent of value of output from agriculture.

[7] In the fourth FYP share of Animal Husbandry and Dairying in total central plan allocations has reached a record level (around one per cent); the respective shares has in general been low (less than 0.5 per cent) in most of the plan period and this is as low as 0.2 per cent in the tenth plan period (details see Jha B 2003).

[8] Though there are other indicators to evaluate cooperative network like number of cooperative societies and number of members in the societies; these figures often conceal facts related to health of the societies; in this context milk throughput is a better indicator of cooperative network therefore has been considered in the present discussion.

[9] Population of cross-bred cattle is available only after the year 1987; this is presented in the Annexure Table 3.

[10] In India cow accounts for less than 40 per cent of aggregate milk production.

[11]There has been wide disparity between proportion of exports and imports over the years. Though some of this disparity is expected on account of time lag in recording trade in the exporting and importing country. Imports were always lower than the exports during the reference period, one of the probable reasons may be over-invoicing of exports and under-invoicing of imports in the trading countries.

[12] A 50 per cent reduction of 10 per cent *advalorem* duty comes to 5 percent only whereas 50 per cent reduction of 50 per cent *advalorem* duty will be 25 per cent. Generally countries have reduced lower tariffs by higher rates for commodities not significantly important to maintain average tariff reduction.

[13] This increase is over the 1991-93 base period and is for the year at the end of the WTO implementation period (2002).

[14] Under this programme commercial credit is extended to finance agricultural export sales to low or middle income countries. These programmes are covered under the Green Box policies so there is no limit on this.

[15] The US export subsidies for dairy products were more concentrated in SMP and subsidies were higher to the export consignments heading towards South-east Asian countries.

[16] The base-period for export subsidy was 1986-90, some countries in order to take advantage of the higher export subsidy during the base period considers 1989-90 as base for subsidy reduction; this phenomenon is known as front-loading. Similarly few countries depending on its conveniance have used 1986-88, as base for subsidy reduction, this is known as back loading.

[17] The FAO trade statistics is basically approximation of data supplied by the DGCIS, which adopted Harmonised system (HS) in the late '80s (1987-88). The system of code for FAO trade data is different; it is SITC instead of HS.

[18] The exports apart from various domestic constraints often suffer from inadequate quality standards. There is WTO Agreement on Sanitary and Phytosanitary Standard (AoSPS) to monitor quality standard; India's position on this account has been extremely poor (details see Jha B 2003).

[19] In countries like New Zealand milk production activity is highly mechanized and is done at a large scale while in countries like India, milk production is basically a small-holder activity with meager amount of marketed surpluses. The processing units have to incur significant expenditures in collecting this milk and maintaining its quality.

[20] In milk production, oil cakes are probably the most important purchased inputs; this has assumed greater importance with the spread of crossbred technology in the country. Prices of oilcakes have therefore been taken as a proxy for cost of milk production in the present study.

[21] The marketing cost of imported goods in a region also depends on its proximity to the coast more specifically to port. The cost of transportation of a perishable commodity like dairy is higher than many other agricultural commodities; as a consequence, market prices at distant places are not affected with imports of milk products at even lower prices.

[22] This calculation is for the year 1999-2000 when one US$ was equivalent to INR 43.1; please note the change in units tonnes and quintals as well.

[23] A relatively higher variation in the real price of milk is causing error in this estimate; as a consequence the estimate is not significant.

[24] In most of the selected states increase in demand has been more than 10 per cent, in UP this increase has been less than 10 per cent; altogether this increase appears to be around 10 per cent of aggregate demand

[25] The state of performance of Government investment can be understood from the fact that government support in health infrastructure has not been able to protect animals from some of the preventive diseases. The endemic diseases persist in the country even today.