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**TRADE LIBERALIZATION, MARKET REFORMS AND
COMPETITIVENESS OF INDIAN DAIRY SECTOR**

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ABSTRACT

From chronic shortages of milk, India has emerged today as the largest producer of milk in the world crossing 80 million tonnes. This has been achieved largely through a smallholder economy in which “*Operation Flood*”, one of the world’s largest dairy development programme, played an important role. All this happened largely under autarkic framework and regulated public policy dictated by import-substitution strategy. Until 1991, the Indian dairy industry was highly regulated and protected through quantitative restrictions (QRs) and stringent licensing provisions. Since early 1990s, India embarked upon liberal policy framework, which got reinforced with the signing of Uruguay Round Agreement on Agriculture (URAA) in 1994. This opening-up increasingly exposed the Indian dairy sector to the global markets, which in-turn are distorted by export subsidies, domestic support and prohibitive tariffs in developed countries. This raises several issues:

- Will the Indian dairy sector survive in the new brave world of liberalization?
- What are the options for India in the coming rounds of multilateral trade negotiations, given scores of distortions that plague the world dairy markets?
- What sort of domestic reforms are required in the Indian dairy sector that could promote its competitiveness in a fast globalizing world?

This study responds to these issues by empirically mapping the competitiveness of Indian dairy sector over the period 1975-2000 and delineating policy options for international negotiations and more importantly, domestic policy reforms, given India’s commitments to the WTO.

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TRADE LIBERALIZATION, MARKET REFORMS AND COMPETITIVENESS OF INDIAN DAIRY SECTOR¹

Vijay Paul Sharma² and Ashok Gulati³

I. BACKGROUND

From chronic shortages of milk, India has emerged today as the largest producer of milk in the world crossing 80 million tonnes (GOI, 2002). This success story of Indian milk production has been written primarily by millions of smallholder producers, who dot the landscape of milk production in the country. Although the yields have remained quite low compared to the world standards yet it has not only survived but also flourished. Several factors appear to have helped it flourish. The “*Operation Flood*” one of the world’s largest dairy development programs, which helped to create strong network and linkages among millions of smallholder producers, processors and urban consumers, was an important instrument in achieving this success. It is well known that all this happened under autarky and highly regulated domestic markets. The commercial imports and exports of almost all dairy products had been banned for most of the time and processing activity had been controlled through licensing which favored cooperatives over private entrepreneurs. Since early 1990s, India embarked upon liberal policy framework, which got reinforced with the signing of Uruguay Round Agreement on Agriculture (URAA) in

¹ Thanks are due to Chris Delgado for his valuable comments on an earlier draft of this paper.

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1994. The dairy industry was delicensed in 1991 and the private sector including multi-national companies (MNCs) was allowed to set up milk processing and product manufacturing plants. However, in 1992, controls were brought back through the 'Milk and Milk Products Order' (MMPO⁴) with a view to have 'orderly growth' of dairy industry in India. The opening-up increasingly exposed the Indian dairy sector to the world markets, which have been distorted by high subsidies and support in the developed countries. This raises several issues.

- Will the Indian dairy sector survive in the new brave world of liberalization?
- What are the options for India in the coming rounds of multilateral trade negotiations, given the distortions that plague the world dairy markets?
- What sort of domestic reforms are required in the Indian dairy sector that could promote its competitiveness in a fast globalizing world?

This study responds to these issues by reviewing the experience of implementing the commitments made under the URAA and empirically mapping the competitiveness of Indian dairy sector over the period 1975-2000. The study then suggests policy options for international trade negotiations, and more importantly, domestic policy reforms, given India's commitments to the WTO.

The paper begins with a review of changes in the Indian dairy sector and the impetus for those changes (Section II). Section III gives an overview of world dairy

⁴ The order required no permission for units handling less than 10,000 litres of milk per day or milk solids up to 500 tonnes per annum (TPA). It prescribed State registration to plants producing between 10,000 to 75,000 litres of milk per day or manufacturing milk products containing between 500 to 3,750 tonnes of milk solids per year and plants producing over 75,000 litres of milk per day or more than 3,750 tonnes per year of milk solids have to be registered with the Central Government. During March 2002, the MMPO was amended and restrictions on setting up new capacity and concept of milkshed were removed.

sector and discusses URAA commitments and compliance, paying attention to the issues that cropped up during the implementation process. Section IV examines the global competitiveness of Indian dairy sector through Effective Rates of Protection. The paper ends with some concluding remarks on India's experience under URAA and directions for future policy choices.

II. INDIAN DAIRY SECTOR

Milk production is an important rural activity in India providing supplementary income, employment and nutrition to millions of rural households. With a value of output of about Rs. 82,624 crore (US\$19,639 million) during 1998-99, it ranked first, surpassing rice, in India's agricultural sector (CSO, 2000). The output of milk and milk products has increased faster than crops since the 1970s. The higher income elasticity of demand for milk and milk products (1.96 in rural and 1.32 urban areas) coupled with growing urban population and changing food habits meant rapid growth in demand, which has been met by higher rate of growth in production (Saxena, 2000).

CHARACTERISTICS OF INDIAN DAIRY SECTOR

India is the largest milk producer in the world and milk production is based on smallholder system with one or two milch animals.

Milk production in India takes place in millions of rural households scattered across the country. A survey of "Operation Flood" areas in 1995-96 (Shukla and Brahmankar, 1999) showed that marginal farmers and landless households account for

about 44 percent of total milk production in the Operation Flood areas. It also showed that about 72 percent of the households having milch animals had only one or two animals each. This share varied across regions, from about 90 percent in the East to about 60 per cent in the North. However, the comparison of the composition of milk producers (category-wise) over 1988-89 to 1995-96 does not show any significant change in the composition of milch animal households in Operation Flood areas.

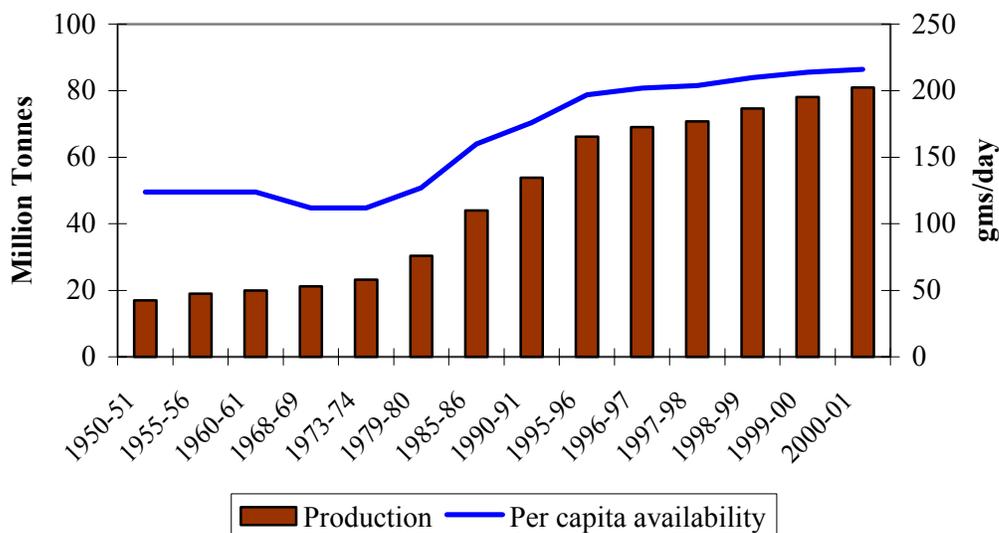
Milk production was more or less stagnant during the 1950s and 1960s (Figure 1) and annual production growth was negative in many years. The per capita availability of milk declined which concerned the policy makers. During the second-half of the 1960s the government of India made major policy changes in dairy sector. Milk production in rural milksheds through milk producer cooperatives and movement of processed milk to urban demand centres became the cornerstone of government policy for dairy development. This single policy initiative of the government gave a boost to dairy development through:

- linking-up rural producers with the urban consumers through pricing, procurement, processing and marketing, which reduced transaction costs, and
- large public investment in milk processing sector (chilling plants, milk processing and product manufacturing plants) through cooperatives acted as a catalyst to bring about the revolution

The performance of Indian dairy sector over the last three decades (post-OF period) has been extremely impressive. The milk production in the country has more than trebled to over 80 million tonnes between 1970-71 and 2000-01 with an average increase of about 4.5 per cent per annum, which in comparison to world's rate of about 1

per cent is much higher. Though India has become the largest milk producing country in the world, its position in terms of per capita availability is one of the lowest. The per capita availability of milk was about 124 gms per day in 1950-51, and declined to 112 gms per day in 1970-71. But the dairy sector took a leap forward after 1970-71 and per capita availability of milk increased from 112 gms in 1970-71 to about 214 gms per day in 2000-01 (Figure 1). However, the present level of per capita availability is much below the world average of 285 gms and even less than 220 gms recommended by the Nutritional Advisory Committee of the Indian Council of Medical Research (ICMR).

Figure 1—Trends in milk production and per capita availability in India; 1950-51 to 2000-01

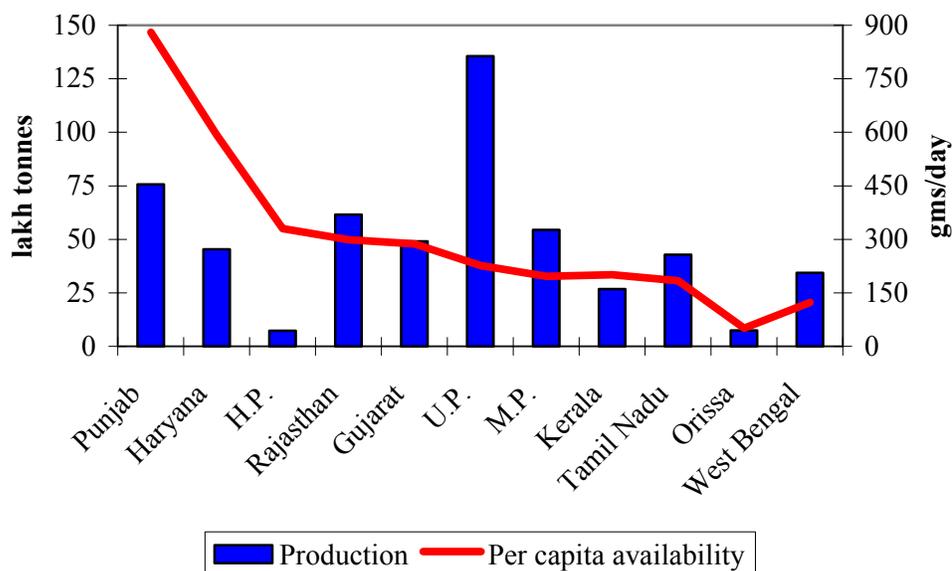


Source: GOI (2001)

Uttar Pradesh was the largest milk producing state in the country, producing about 13.5 million tonnes of milk, followed by Punjab (7.6 million tonnes), Rajasthan (6.2 million tonnes), Maharashtra (5.6 million tonnes) and Madhya Pradesh (5.4 million tonnes) in 1998-99. These five states account for about more than half of India’s milk

production. In terms of per capita availability of milk, there are wide inter-state and inter-regional disparities. The per capita availability of milk is higher in the northern states like Punjab (880 gms/day), Haryana (592 gms/day) and Himachal Pradesh (330 gms/day) whereas the eastern states have low availability of milk (51 gms in Orissa to 123 gms in West Bengal per day) (Figure 2). Considering per capita milk requirement recommended by the ICMR at 220 gms per day, only seven states, namely, Punjab, Haryana, Himachal Pradesh, Rajasthan, Gujarat and Uttar Pradesh have per capita availability of milk above this level. There is also a wide disparity in consumption of milk between the rural and urban areas.

Figure 2—Milk production and per capita availability of milk in selected states in India; 1998-99



Source: GOI (1999, 2001)

POLICY ENVIRONMENT

The main weakness in the pre-OFP dairy development efforts was lack of an adequate marketing link between the rural producer and the urban consumer. The OFP sought to forge this link through the cooperative structure. To promote domestic production under cooperatives, it was protected from cheap imports on the one hand and competition within the organized sector was restricted through licensing. The industrial licensing was abolished in 1991, but re-introduced in another form as MMPO in 1992.

As a part of agriculture, dairy sector in India comes under the State subject for policy concerns. The central government, however, has taken a lead in formulating policies in this sector at the national level while implementation of these policies has been largely left to the State Governments. Dairy development in India has been the charge of the cooperative sector for the last two and half decades, beginning with the Operation Flood Program (OFP) in 1970-71. Before 1970-71, the government's development efforts were focused on improvements in the stock of milch animals through various programs. The pre-OFP efforts led to the establishment of a network of veterinary hospitals all over the country. Government implemented a number of city milk supply schemes to meet the needs of urban consumers. However, the major weakness of dairy development programs was missing link between producers and consumers.

The Operation Flood program was launched in 1970-71 and dairy development through producers' cooperatives and milk production based on milksheds was promoted in the rural areas. The first phase of the programme, termed Operation Flood-I (OF I)

lasted from 1970-71 to 1980-81 and the second stage of OF lasted from 1978-79 to 1984-85. There was a transition period of two years, 1985-86 and 1986-87 before the OF III began in 1987-88 and ended in April 1996. The OF programme was a major policy development which provided the missing market link between the urban milk consumers and the rural producers through a network of co-operatives. The decision to promote dairy development through cooperatives was based on a number of considerations, chief among which was that dairying would be a means to provide an additional source of employment and income to small and marginal farmers and landless labourers in rural areas (NCA, 1976). Once decision to adopt cooperative structure as a means for dairy development was taken, government policies were formulated to support dairy cooperatives and large public investments were made in processing and marketing infrastructure through cooperatives.

To promote domestic production under cooperatives, it was protected from cheap subsidized imports of dairy products (milk powder and butter oil) through various import restrictions. The Indian Dairy Corporation was the canalizing agency for milk product imports. These products were available in international markets at prices, which made reconstitution of milk cheaper than collecting and selling fresh milk. Milk procurement, processing capacities, and urban supplies all grew in matching proportion transforming India the only self sufficient, and modern dairy country in the Asian region. However, all this happened in a closed economy environment. India adopted import substitution policy where protection to domestic dairy sector from imports was provided by imposing quantitative restrictions (QRs) and other non-tariff barriers such as canalizing of imports and exports of the dairy products. The competition from organized private sector was controlled

by utilizing the provision of industrial licensing under Industrial Development and Regulation Act of 1951 to prohibit new entrants into milk processing sector⁵.

In the early nineties, the Government of India introduced major trade policy reforms, which favored liberalization of all sectors of economy and dairy sector was no exception to this. The dairy industry was de-licensed in 1991 with a view to encourage private investment and flow of capital and new technology in the sector. The competition from the organized private sector was immediate in the form of sharp increase in capacities for milk processing, especially in areas where milk availability was relatively significant. Within a year of delicensing, over 100 new dairy processing plants came up in the private sector. However, in 1992, the Milk and Milk Products Order (MMPO) was promulgated under the Essential Commodities Act of 1955 to regulate milk and milk products production in the country. There were certain inherent weaknesses in the MMPO; for example, every unit was required to develop its milkshed area outside the existing milkshed areas to procure milk for processing. In some cases the milkshed areas were quite far away from the processing units, which increased the cost of transportation and also affected quality of raw milk as many of the units did not have required infrastructure (cold chain) to procure and transport milk. Since in many of the existing milksheds, the procurement by organized sector was low, it was surprising to restrict the entry of other players in those areas. Recognizing the need for suitable amendments in the MMPO 1992, Government of

⁵ Although there is no direct evidence in the form of number of license applications that were denied, some indirect evidence that can be cited is: (1) The Jha Committee (Government of India, 1984) recommended that no fresh licenses be issued to the private dairies in the organized sector until a Dairy Development Council was formed (which was not formed) and (2) the capacities in the condensed milk and malted milk food, the two products in which the private sector had a dominant share actually declined between 1984 and 1990.

India has made amendments from time to time in order to make it more liberal and facilitate the dairy development. During 2001, government made some important amendments in the MMPO, whereby the registration of units handling up to one lakh litres of milk per day or 5000 tonnes of milk solids per annum was granted by the concerned State government and the requirement of renewal of licence was abolished. But the government controls, regulations, and licensing requirements restricted large Indian and multi-national players for making significant investments in this sector. The operation of MMPO was by and large limited to registration of the processing units and some of important provisions relating to food safety, quality, and hygiene were ignored completely. Therefore, the MMPO had lost its relevance in the era of trade liberalization and globalization, where India had opened up its dairy sector to world markets but still there were controls/restrictions on free entry of new players in the domestic markets. However in March 2003, Government of India abolished the restrictions on setting up milk processing and milk product manufacturing plants and removed the concept of milkshed while requirements relating to food safety and hygiene were retained in the MMPO. This was expected to facilitate entry of large companies, which would definitely increase competition in the domestic markets.

On the other hand, the present co-operative legislation is not conducive for preserving and promoting autonomy of the producers' co-operatives, which has resulted in erosion of their functioning. Moreover, bureaucratic and political interference at many levels plague the co-operatives in India. As a part of a concerted programme to revitalise the co-operative sector and providing level-playing field, government has initiated reforms to free producers' co-operatives from unnecessary bureaucratic and political

clutches by making changes in the Multi-State Co-operative Societies Act of 1984 and similar amendments in the State Acts on the lines of the Model Co-operative Law. The co-operatives should be managed and run on commercial lines and corporatisation of co-operatives will enable co-operatives to compete effectively in open market environment.

III. WORLD DAIRY SECTOR: WTO COMMITMENTS & COMPLIANCE

The world dairy market is plagued by high degree of distortions, especially by the EU, USA, Japan and Canada. The URAA was expected to put some disciplines on these protectionist policies but

The world dairy markets are very thin where only 5-6 per cent of global production is traded (excluding intra-EU trade). Trade in dairy products is also extremely concentrated in terms of buyers and sellers. In general, low value products are exported to developing countries and high value products are traded largely among developed countries. The major exporters of dairy products are the EU, New Zealand, Australia and the USA and accounted for about two-third global SMP exports, about 84 per cent of WMP and 75 of butter and butter oil and cheese exports during 1995-98 (WTO, 2000). In many of the large markets, the bulk of domestic consumption is satisfied from domestic production, and only a small proportion of the dairy products are imported. For example, only 2 per cent of the cheese consumed by the European Union and only 5 per cent of that consumed by the United States is imported.

Dairy industry globally remains one of the highly supported agricultural activities, and the use of protectionist policies and export subsidies continues to distort world trade

in dairy products. The Uruguay Round of multilateral trade negotiations achieved only limited success in increasing market access and reducing export subsidies. It did, however, establish a framework for negotiating further reductions in support. Under the World Trade Organization Agreement on Agriculture, it was agreed that non-tariff barriers, such as import quotas would be converted to tariff equivalents, and these tariffs then progressively reduced. A small in-quota tariff would be applied to a minimum access quantity, and a higher above-quota tariff applied to quantities beyond this minimum. Domestic support and Export subsidies were also to be reduced. While the changes established a framework for reform, they are yet to have an appreciable impact on the dairy market.

Even before the URAA, there have been attempts to contain distortions in the world dairy markets. The most notable of these actions has been the International Dairy Arrangement (IDA) that remained in operation for 15 years from 1980 to 1994. In 1994, IDA had sixteen participants: Argentina, Australia, Bulgaria, Egypt, the European Community, Finland, Hungary, Japan, New Zealand, Norway, Poland, Romania, South Africa, Sweden, Switzerland and Uruguay. There have been two major stated objectives of IDA:

- i. To achieve the expansion and liberalization of world trade in dairy products under as stable as possible market conditions on the basis of mutual benefit to exporting and importing countries; and
- ii. Furthering economic and social development in developing countries

In order to achieve these objectives, detailed protocols were annexed to the IDA. Three important commodity protocols related to milk powders, milk fat and certain types of

cheese. These commodity protocols essentially specified the minimum export prices for SMP, WMP, buttermilk powder, anhydrous milk fat, butter and certain types of cheese from time to time to be followed by the member countries of IDA.

Despite several practical difficulties in implementing IDA, especially its protocols regarding minimum export prices, it was able to gradually lift the world export prices from the low of second half of 1970s. It ran into serious trouble in the initial stages itself, from 1983-86, when actual export prices were putting pressures to pierce through the floor. Thereafter, although there had been some occasional hiccups, the actual export prices have been revived above the floor. The agreed minimum export prices under IDA had been operative since 1980, which was suspended from October 31, 1995.

On January 1, 1995, the International Dairy Agreement replaced International Dairy Arrangement, which had operated since 1980. The International Dairy Agreement was one of the four-multilateral agreements resulting from the Uruguay Round negotiations. Unlike the other WTO Agreements, membership in multilateral agreements was limited to those countries, which had explicitly accepted them. However, due to expectations that the results of the WTO Agreement on Agriculture will address some of the concerns which initially led to the establishment of the International Dairy Agreement, and the fact that emerging technologies have opened other avenues for information exchange, a number of Members of the previous International Dairy Arrangement decided not to join the new International Dairy Agreement. The major function of this Agreement was again to fix the minimum export prices for various dairy products. But it became extremely difficult for its member countries to adhere to these prices especially when some major players who were not members of this Agreement (e.g. the US and Australia) undercut the exports of these

countries. The International Dairy Council, which was established to administer the Agreement, noted the limited membership in the Agreement and in particular non-participation of some major dairy exporting countries, made operation of the minimum support price provisions untenable. Accordingly, it decided to suspend the operation of minimum export prices for all dairy products and the International Dairy Council decided to continue to review the world market situation for dairy products at its regular meetings (twice a year) based on background information prepared by the WTO Secretariat and review the functioning of the Agreement.

However, the International Dairy Agreement only functioned under the WTO auspices for the first two years of its existence i.e., up to 31 December 1997, whereupon the Agreement was terminated (WTO, 1997).

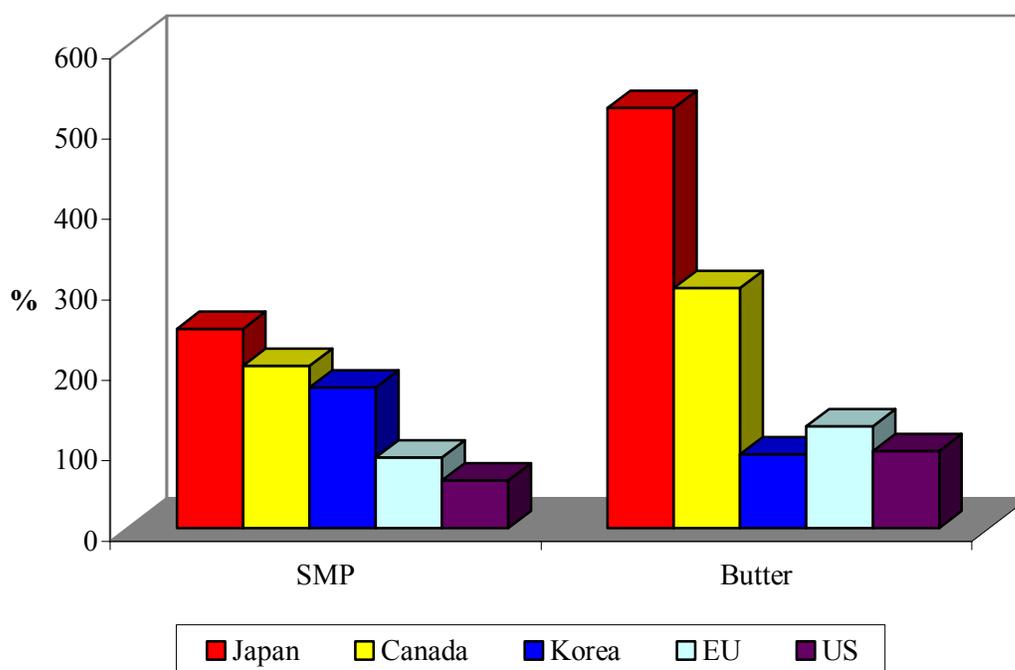
POLICIES INFLUENCING WORLD DAIRY IMPORTS

In many of the developed countries, domestic prices are supported at levels significantly above the world price. The extent of this support in the European Union, the United States, Japan and Canada is quite high. If imports were unrestricted, larger volumes would be imported from the world market and internal prices would fall. To prevent this happening, governments limit import market access by using tariffs and tariff rate quotas. The three issues of interest here are the size of the tariffs, the question of quota under-fill and use of special safeguards provision.

Tariffication was expected to result in tariffs no more protective than the non-tariff barriers that existed prior to the URAA, however, there were number of factors that

have prevented this from occurring, e.g. selection of base period, methods of reducing tariffs (simple average), changes in actual protection between base period and end of UR negotiations, special safeguards provisions, etc. The level of support for dairy sector during the base period 1986-88 was abnormally high, which indicates that reduction in tariffs from base period would not increase trade in this sector (OECD, 2001). Most of the importing countries generally use tariff rate quotas (TRQs), and imports are effectively limited to the quota level or below by the imposition of prohibitive tariffs on any out-of-quota imports. However, dairy imports are commonly subjected to ordinary tariffs in contrast to a TRQ in Europe and in Asian and South American countries. Ordinary bound tariffs for dairy products average about 40 per cent in Asian countries, 60 per cent in Latin America, 100 per cent in Africa and the Middle East and 130 per cent in Europe (USDEC, 1999). All individual tariffs are subject to high tariff peaks, with Japan at top in case of SMP (248%), followed by Canada (202%), Korea (175%) and the EU (88%). In case of butter, the bound rate is as high as 523% in Japan, followed by Canada (299%) and the EU (Figure 3). Therefore, while supposedly opening up barriers, tariffication in effect increased the protection in the EU, Japan and US markets by significant amounts. Achieving more uniform structure of over-quota tariffs for dairy products is a key goal for milk producing countries.

Figure 3—Final UR over-quota tariffs for SMP and butter in selected countries



Source: USDEC (1999)

In many countries there is a considerable gap between the levels of tariff bound in the WTO Schedules and that, which is actually imposed on the imports. This has been called “water policy” and gives the country concerned some flexibility to raise tariffs within the constraint of bound rate. A comparison of EU tariff equivalents with applied tariffs during 1995-97 revealed substantial margin of “water” in the EU’s tariffs for dairy products. For SMP, this stems from a small price gap (tariff equivalent) and high tariffs, whereas for butter, although the price gap was large, the applied tariffs were in excess of 130 per cent between 1995 and 1997 (Sharma, 2000). Removing such “water” would

improve transparency and reduce the discretionary element of protection that countries were able to build in to the URAA tariff bindings for their own flexibility.

The special safeguards (SSG) provisions raise a number of important issues in the implementation of the market access provisions. First, only 38 member countries (mostly developed) have reserved the right to use the SSG in their URAA schedule of commitment. Second, the agricultural tariff lines covered by the SSG vary from less than one per cent for many developing countries to 31 per cent for the EU, and 59 per cent for Switzerland (OECD, 2001). Product coverage is concentrated in dairy for the US; dairy, meat and fruits and vegetables for the EU and rice for Japan. According to WTO notification, out of total 6,072 tariff lines for which members have reserved the right to use the SSG (about 15 per cent of all agricultural tariff lines), 715 of them concern dairy products (about 12%). During 1995-2000 there have been 649 instances when the SSG has been used (436 price-triggered and 213 quantity-triggered) and out of these, 141 were dairy products (119 price-triggered and 22 quantity-triggered), which amounts to about 22 per cent of the total cases (WTO, 2000). Thus the use of SSG is significantly higher in dairy products and the EU and US are the largest users of SSG provisions.

POLICIES AFFECTING WORLD DAIRY EXPORTS

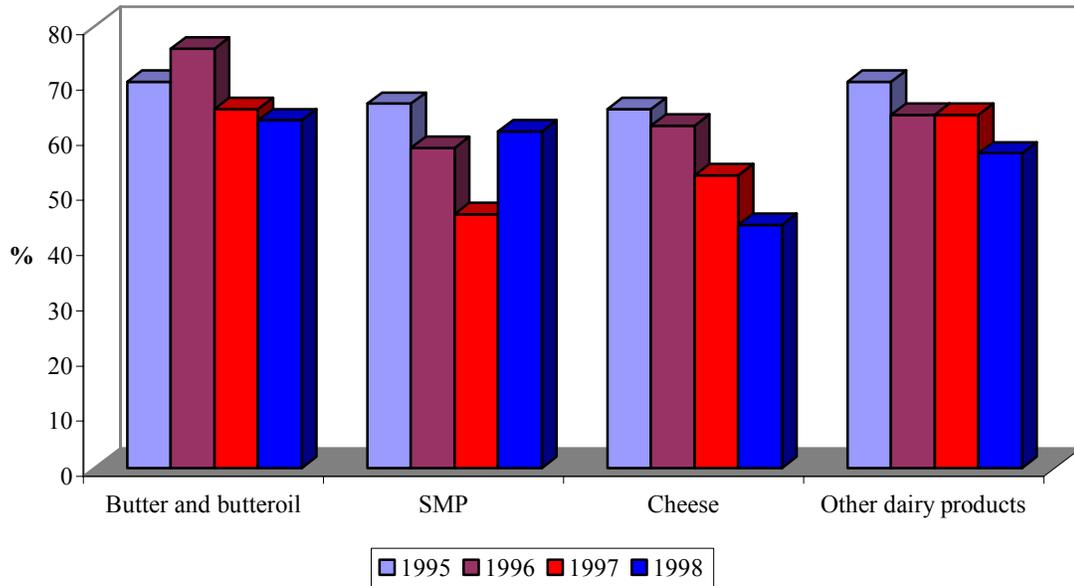
Export subsidy is an important policy instrument mainly in Europe and North America. Until 1985, most subsidized exports were from the EU and mainly for dairy products, cereals, beef and wine. In 1985, United States also initiated a policy of subsidizing exports particularly for dairy, wheat and other cereal and cereal products.

Now export subsidization has become a major policy instrument to dispose off surpluses on to the world markets.

Between 1995 and 1998, WTO members spent over US\$27 billion for subsidizing exports. Of the 26 countries that have commitments to reduce export subsidies, the EU is the largest user of export subsidies in both value and volume terms. The European Union accounted for nearly 89.4 per cent of subsidy expenditures, Switzerland 5.1 per cent, the US 1.5 per cent, Norway 1.3 per cent and other member countries just 2.7 per cent during 1995-98 (IATRC, 2001).

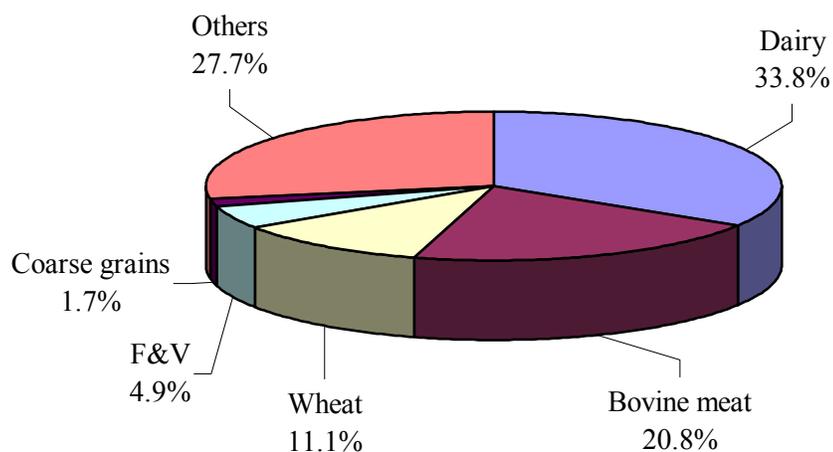
In case of dairy products, more than two-third volumes of exports in the OECD countries were subsidized over 1995-98 (Figure 4). The comparison of subsidized dairy products with other agricultural products indicate that the share of subsidized exports to total exports is one of the highest for dairy products in the OECD countries in the post-WTO period. The EU subsidized nearly all of its exports of dairy products, namely SMP, cheese and butter and butter oil during the same period (OECD, 2001). Dairy products accounted for 65 per cent of Swiss subsidy expenditure and nearly 80 per cent of subsidized export volumes, averaging nearly US\$230 million and 59,000 tons per year. Similarly, nearly 98 per cent of US export subsidy expenditures have been for dairy products (under the Dairy Export Incentive Programme) (IATRC, 2001). Global expenditure on export subsidies by WTO members has been highest for dairy products, accounting for 34 per cent of all export subsidy expenditures from 1995-98 and there is high concentration of subsidies to a few countries and a few commodities (Figure 5).

Figure 4—Share of subsidized exports in total export of the same products in the OECD (volume by product category)



Source: OECD (2001)

Figure 5—Share of Subsidized dairy product exports in total subsidized exports of agricultural products in OECD during 1995-98



Source: OECD (2001)

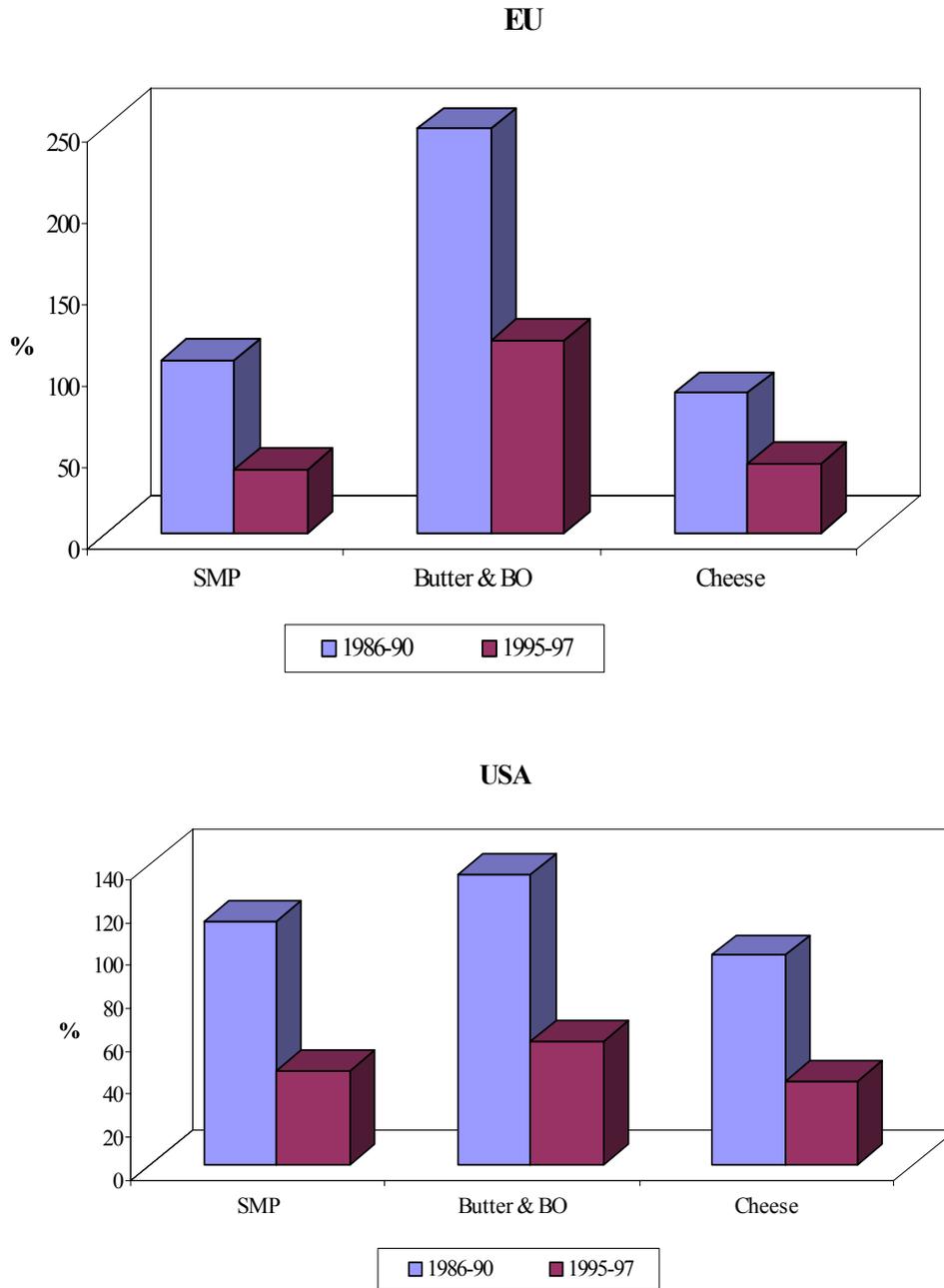
The comparison of export subsidy equivalent (per unit export subsidy/world price) indicate that despite some decline in rate of export subsidy for most dairy products in the recent years compared to base period, still are high in many products. For example, the export subsidy equivalent varied from 39 per cent for SMP in the EU and cheese in the US to as high as 152 per cent for cheese in Norway and 118 per cent for butter and butter oil in the EU during 1995-97 (Figure 6). The export subsidy rates are substantially higher for dairy products. Although the export subsidy was expected to decline during the implementation period compared with the base period levels, the export subsidy levels are quite high at the end of implementation period. For instance, the average export subsidy on butter and butter oil was about US\$ 2,686 per ton in the case of EU during 1995-2000, which is almost one and half times higher than the world

price. Similarly, the export subsidy that could be given by the US on the SMP and cheese during 1995-2000 was about two-third of world market price, which clearly indicates a great scope for subsidizing dairy products even after the implementation of the URAA (Figure 7).

DOMESTIC SUPPORT ISSUES

If the AoA is judged purely on the basis of the level of support for agriculture in general and dairy sector in particular it seems to have had a very limited impact. In fact, domestic support levels in the EU and the United States were as high in the second half of the nineties as those in the 1986-88 base period. There remain some key sectors, and dairy is one of them, where adjustments to less production/trade distorting outcomes have yet to take place.

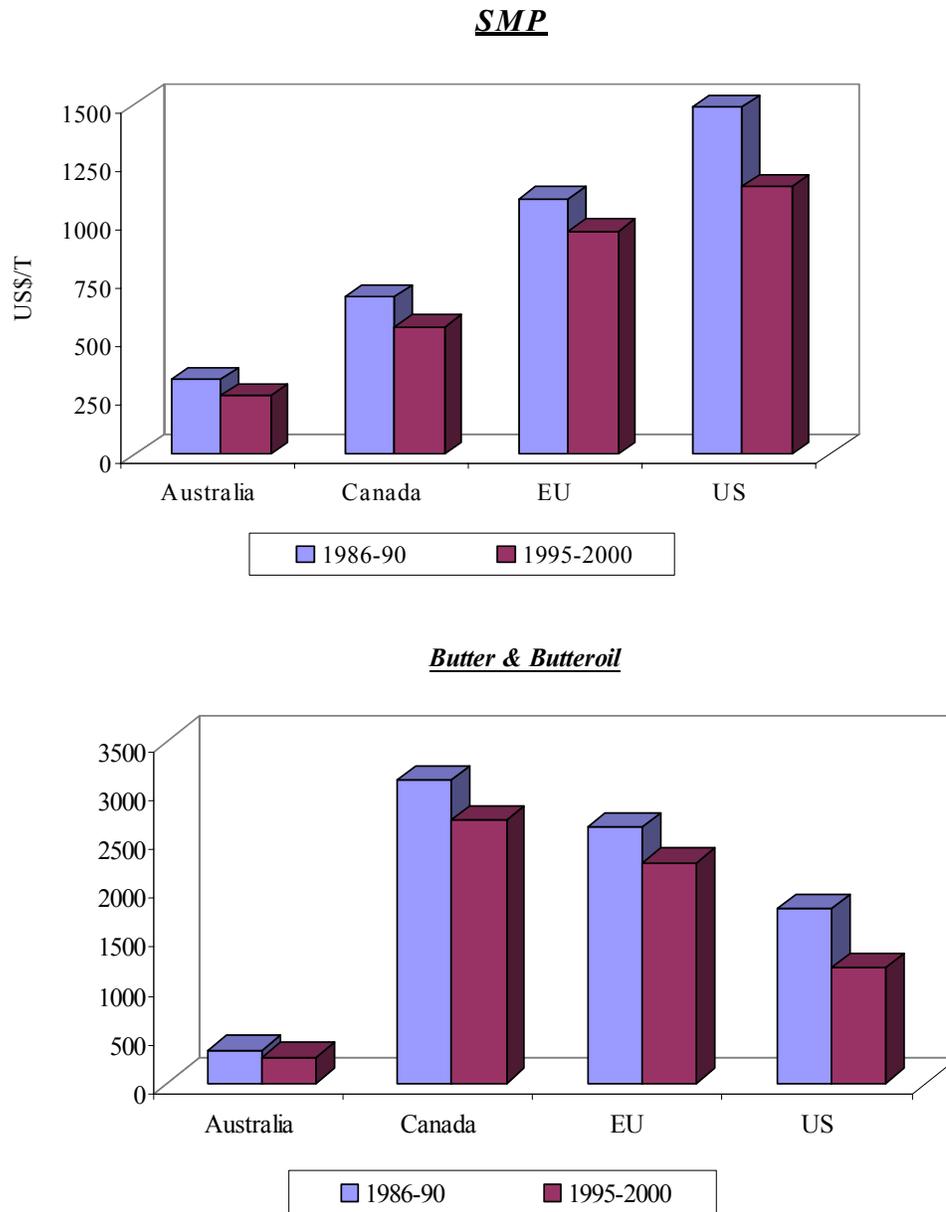
Figure 6—Export subsidy rates⁶ (%) for major dairy products in the EU and United States: 1986-90 and 1995-97



Source: OECD (2001)

⁶ Export subsidy rate is per unit export subsidy divided by world price and multiplied by 100.

Figure 7—Implied average unit export subsidy⁷ (US\$/tonne) for major dairy products in selected countries; 1986-90 to 1995-2000



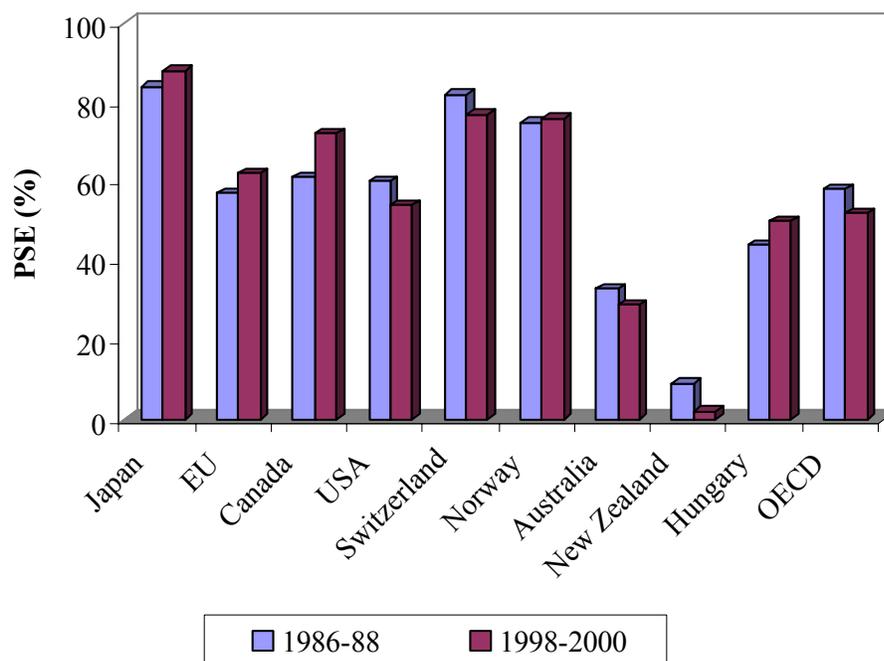
Source: OECD (2001)

⁷ Implied average export subsidies are calculated by dividing value commitments by volume commitments.

The average domestic support in OECD countries (Amber box, green box, blue box, *de minimis*, and special and differential treatment) amounted to nearly US\$ 234 billion in the 1986-88 base period, which increased to US\$ 282 billion during 1995 and then declined by about 7 per cent in 1996 and 12 per cent in 1997 to US\$ 232 billion (OECD, 2001). The domestic support is concentrated in three countries namely, the EU, United States and Japan accounting about 90 per cent of the total OECD domestic support. Annex 2 (Green Box) subsidies have increased for the EU from about US\$10.2 billion in 1986-88 base period to US\$25.1 billion in 1996 and for the US, these subsidies have likewise more than doubled, from US\$ 24 billion in 1986-88 to US\$ 51 billion in 1997. Most of the countries have shifted support from Amber box to green and/or blue box policies, which are exempted under the WTO.

The dairy sector is again an offender and continues to receive considerable support in a number of developed countries. The OECD data shows that the share of dairy sector in the total support to agricultural products amounted to nearly 16 per cent in 2000 marginally lower than 18 per cent in 1986-88 (OECD, 2001). The Producer Subsidy Equivalent (PSE) estimate for dairy was 48 percent in 2000 compared to 34 per cent for all commodities. There are large disparities in the level of support for agricultural commodities and rice and milk are the most protected commodities (OECD, 2001). In case of milk, Japan, European Union, Canada and United States have very high levels of protection, whereas, Australia and New Zealand have relatively low levels of protection (Figure 8).

Figure 8—Producer Subsidy Equivalents for Milk in Selected OECD Countries, 1986-88 and 1998-2000



Source: OECD (2001)

IV. COMPETITIVENESS OF INDIAN DAIRY SECTOR AND LIKELY IMPLICATIONS FOR TRADE LIBERALIZATION

INDICATORS OF COMPETITIVENESS

Competitiveness is a complex term and can be defined in several ways ranging from domestic resource cost ratio concept to competitive advantage concept encompassing segmented markets, differentiated products, economies of scale and so on. Several models and methods are available for studying the competitiveness of

agribusiness firms and sectors. By far the most popular and simple measures of global competitiveness are: Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC) and Effective Subsidy Coefficient (ESC) (Corden, 1971; Balassa and Schydrowsky, 1972; Gulati *et. al.* 1990; Taylor and Phillips, 1991). These are drawn from neo-classical trade theory that primarily relies on comparison of domestic prices with world prices duly adjusted for freight and other marketing costs and traders' margins.

We have estimated NPCs and EPCs at shadow exchange rates under both importable and exportable hypotheses for the four major dairy products (SMP, butter, *ghee*/butter oil and recombined milk) and for four metro areas (Mumbai, Calcutta, Chennai and Delhi) representing four regions of India over the period 1975-2000 under the following situations:

- i. At given world market prices, i.e., (FOB N. Europe),
- ii. World market prices would increase by about 15% if all distortions in dairy sector are removed (Andrews, et al., 1994, FAPRI, 2001, EC, 1997 & 2001), and
- iii. World prices will be equal to domestic prices in Europe (Netherlands), which reflect the export subsidy component (Domestic price of dairy product in the Europe \cong N. Europe FOB price + export subsidy given by the EU on dairy products)

The estimates of competitiveness have also been calculated at national level on the basis of milk production weights and the resulting estimates are presented in Figures 9 to 12.

A few points are worth noting:

- The level of NPCs estimated at shadow exchange rate for all the four dairy products, namely SMP, butter, butter oil and recombined milk, are well above unity for the

average 26-year period, 1975-2000 and it remained above unity even if estimates are considered at shadow exchange rate (SER). If one allows for some premium on *ghee* over butter oil, and fresh milk over recombined milk, NPC on butter oil and fresh milk, respectively may be somewhat lower than reported here, but they will still remain above unity.

- The estimates of NPCs based on the domestic prices in the EU are significantly lower and even less than unity in most of the cases for all dairy products considered in the study.
- The NPCs calculated under the assumption that world dairy prices would increase by about 15 per cent show that India is competitive in SMP (NPC below unity in recent period) but uncompetitive in case of butter, butteroil/*ghee* and recombined milk.
- The trend in the estimates of incentive indicators is declining. These are much lower in the 1990s than the average of the entire period. This temporal behavior of NPCs is somewhat similar for all products. It is high during the late 1970s, declines during early 1980s, again rises in mid 1980s, and then gradually falls, and tends to approach unity and even goes below unity in 1990s. It is important to note that the level of protection during the second half of 1990s is only one-fifth of the level of protection during the second half of 1970s. The gradual reduction in NPCs especially after the second half of 1980s has been largely due to improvement in world prices, and partially due to falling exchange rate of rupee.

- The NPCs for butter and *ghee*/butter oil showed a different trend. The decline in the NPCs of butter, and butter oil is not as smooth as in case of SMP. In these cases, NPCs declined in early 80s, increased significantly during second half of 1980s (1986-90, base period for WTO commitments) before coming down in 1990s. But almost in all cases, the average NPCs for 1990s are lower than the overall NPC for the entire period of 1975-2000. In case of butter, the NPC values are lowest during the first half of nineties but increased in the second half of the 1990s mainly due to steep fall in world prices.
- Regionally, the patterns of protection are quite similar across all the four metros. But small regional differentiation was witnessed due to differences in domestic market prices and transport costs in these four metro cities.
- On an average, the NPC of reconstituted milk is slightly higher than that of SMP, butter and butter oil. The NPCs of SMP have declined at a much faster rate in the recent years compared to butter and butter oil and the reason for this differential pattern is high export subsidies on fat based products by the EU and the USA due to less demand for these products in the developed countries.
- What these results of NPC (FOB N. Europe) indicate is that India has not been an efficient import substitute of dairy products, if one compares Indian dairy prices with the free trade world prices. However, the reason for this largely can be ascribed to the nature of world prices of dairy products, which have been highly distorted by the large export subsidies of the EU, and US. For example, the average export price (FOB) of SMP was about US\$ 1444 per ton in 1999 and the European Union and United States paid

about US\$ 867 and US\$ 950 per ton, respectively, as subsidy on SMP exports, which was more than 60 per cent of the world prices. There was some decline in the export subsidies to comply with commitments made under WTO but the proportion of export subsidy as percentage of world market prices showed an upward trend (Figure 13). If international prices were not 'artificially depressed' by the policies of EU and USA, protection levels for Indian dairy products would have been much lower and even less than unity in some of the cases.

- The estimates of NPC under exportable hypothesis are somewhat higher than the NPCs under importable hypothesis. This happened primarily because of different adjustments accorded to transportation costs under the two hypotheses. Thus, under exportable hypothesis, the domestic producer has to be extra efficient to compete with world price as well as to compensate for the additional transport cost.
- Broadly, the results of NPC under exportable hypothesis for the four products for the period 1975-2000 convey a similar story as under importable hypothesis that Indian dairy sector had been highly protected all these years from the world prices. It indicates that India could not have succeeded in exports of any dairy product without heavy subsidies and would have had to compete with the subsidized exports from the EU and the US. This situation remains more or less true for almost all the years since 1975 until 2000 except few years during 1990s, when the NPCs for SMP have come down to less than or very close to unity, suggesting some possibility of exports at the margin. The NPC for SMP, e.g. in 1995-96 stood at 0.86 and 0.84 in 2000-01, which was primarily

the result of improvement in world prices. The possibility of exports could be a little higher in the flush season, when domestic prices tend to drop.

- But interestingly, the possibility of exports of butter or butter oil still has not arisen even during 1990s. This suggests that Indian fat prices have been perhaps more protected than the solid-not-fats (SNF) prices or the world market prices for fat based products are highly subsidized. This also shows the preference behavior in consumption patterns in India, that at any given price level Indians would tend to consume more fat relative to SNF, than other consumers. A word of caution at this stage is necessary. The export possibility, and India emerging as export competitive in dairy products is based on very recent results, which one has yet to see over medium to long run whether India remains export competitive or not. To that extent, these policy implications should be treated only tentative. Nevertheless, they are useful, and give us hope that in a world market free from export subsidies, and other distortions, Indian dairy sector has an opportunity to flourish provided it can generate enough surpluses at low costs, and maintain due quality standards.
- The estimates of EPCs conform to the same pattern as NPCs under the importable and exportable hypotheses, because of low share of tradable inputs in the overall cost structures of these commodities. The level of EPCs does not deviate much from their corresponding NPCs.

FACTORS AFFECTING COMPETITIVENESS

The price competitiveness of dairy sector depends upon a number of factors and most important among them are exchange rate, world price and domestic price, which are subject to wide variations over the years. Therefore, it is necessary to analyze the impact of variation in the values of these parameters on competitiveness of dairy industry. But before doing that, the trends in domestic and world market prices of dairy products, and exchange rate are discussed in the following section.

Figure 9—NPCs of SMP under importable hypothesis; 1975-76 to 2000-01

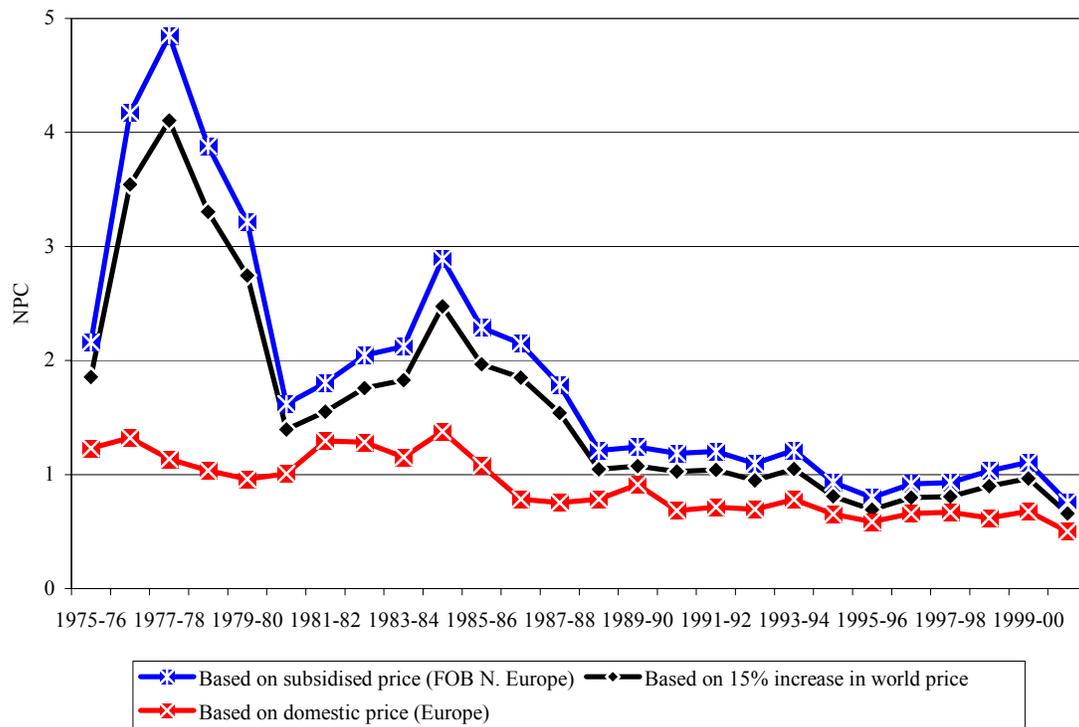


Figure 10—NPCs of butter under the importable hypothesis: 1975-76 to 2000-01

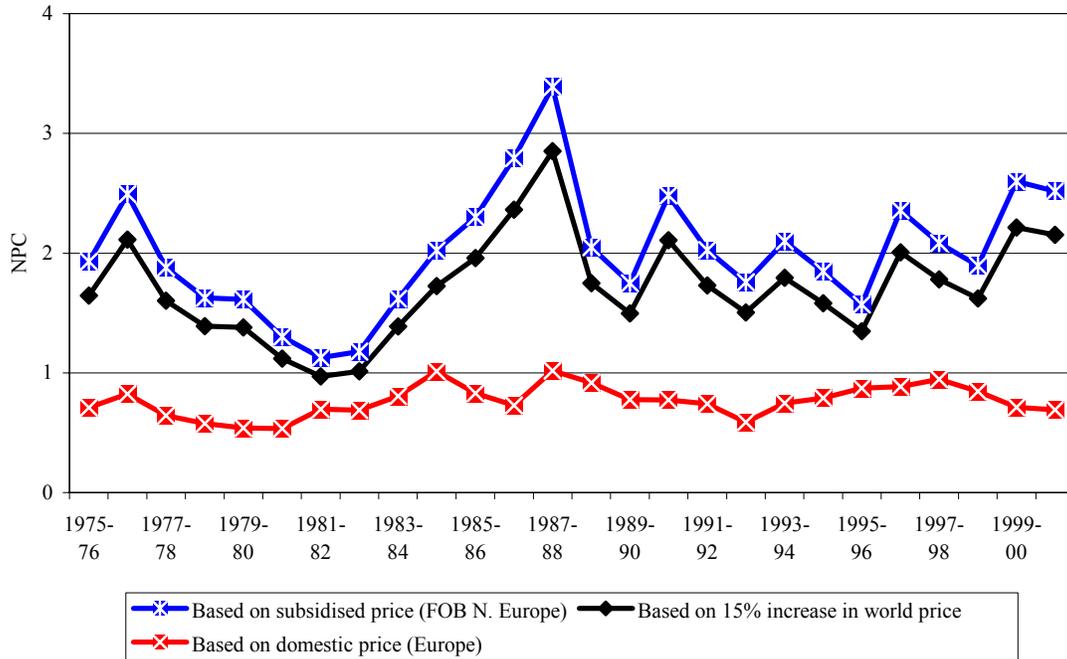


Figure 11—NPCs of *ghee*/butter oil under the importable hypothesis: 1975-76 to 2000-01

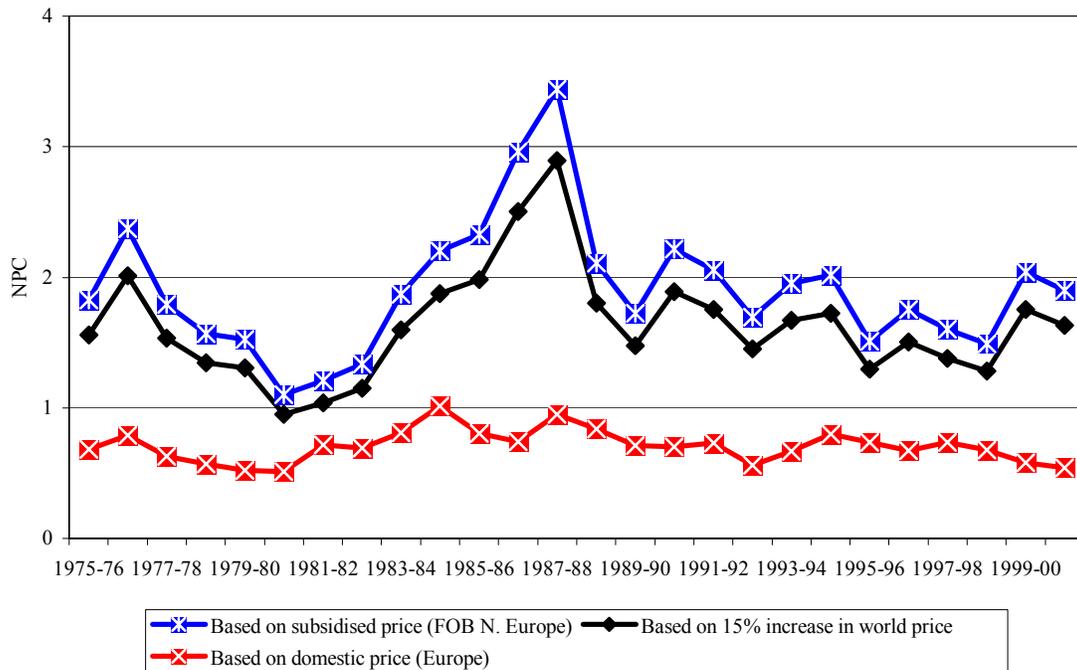


Figure 12—NPCs of milk under the importable hypothesis: 1975-76 to 2000-01

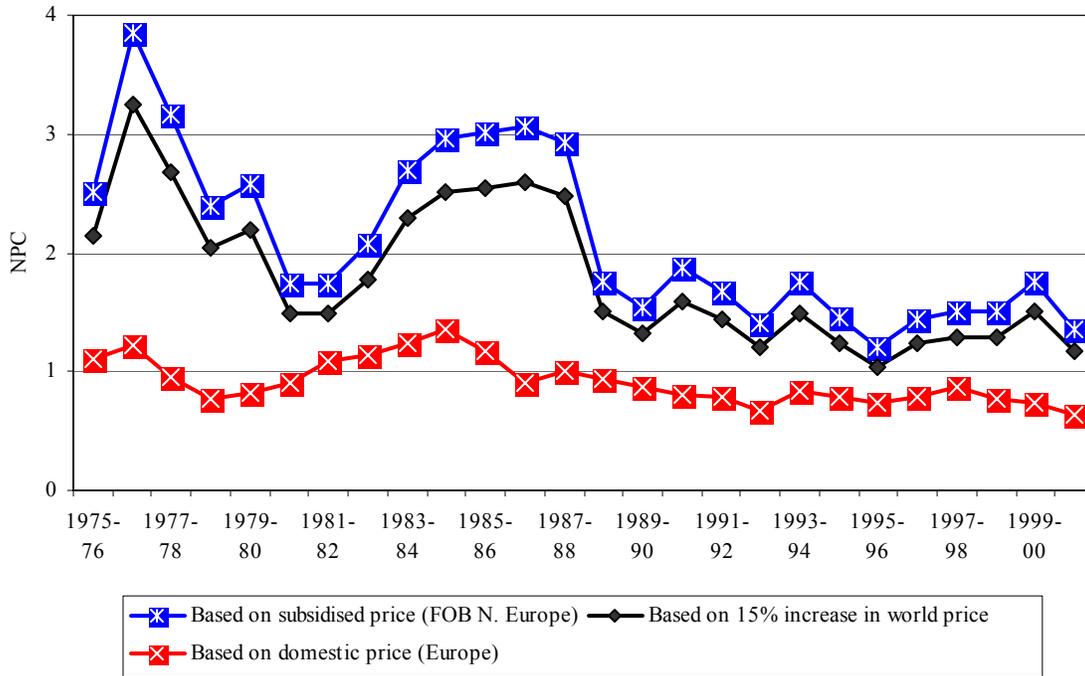
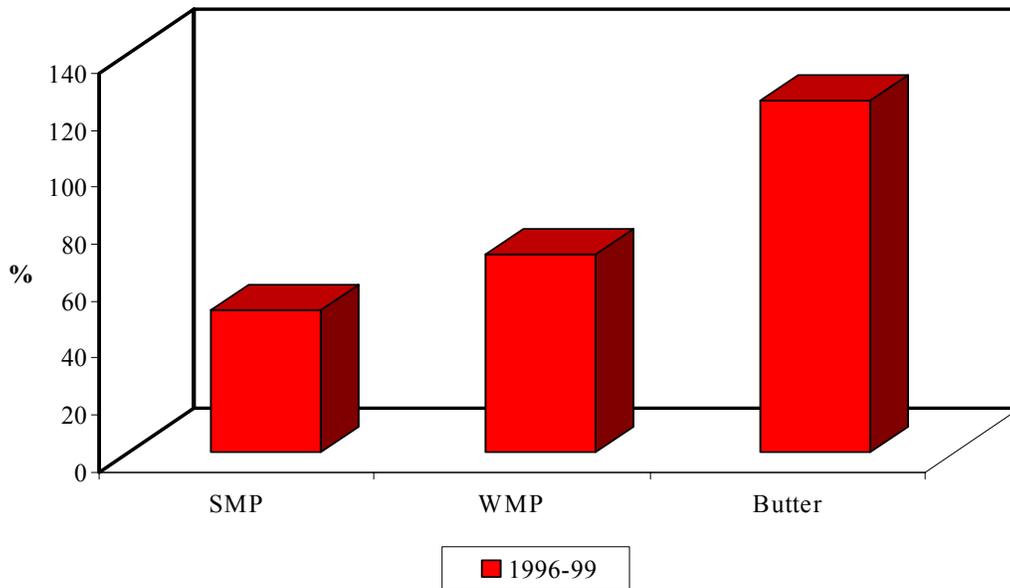


Figure 13—Average export subsidy (percent of world price) per unit of product in the European Union, 1995-99



Source: FAO (2000)

- The world price of dairy products has a great impact on international competitiveness of the Indian dairy industry. However, the world dairy prices are highly distorted by export subsidies and domestic support. The comparison of domestic market prices in India and Netherlands and international price of SMP indicates that the domestic prices in India were substantially higher than the world market prices until mid 1990s but the gap between these prices showed a declining trend during 1975-95 period. The world market prices witnessed a sharp decline in the second half of the nineties but improved in 2000 and 2001. But the interesting observation is that the gap between domestic market prices in the Netherlands and Indian markets showed an increasing trend from mid-80s until 2000. There also exist a large gap between the Netherlands domestic price and world price, which shows presence of high export subsidies.
- In case of butter, Indian domestic prices were much higher than world market prices during 1975-2000 but significantly lower than the Netherlands domestic prices except for few years during the decade of 1980s. The gap between the Netherlands domestic and world market prices was very large and further increased in the second half of the 1990s. For example, butter prices, which had maintained their level better than other dairy products in mid-90s, fell sharply during 1999 and 2000, reaching a level of about US\$ 1300 per ton in 2000. Much of the down turn has occurred recently as demand from Russia has failed to materialize. The EU export subsidy on butter was quite high (125 per cent of the

world price) during 1996-99, which distorted world markets and also depressed prices in importing countries.

- A higher exchange rate increases the realization from an output in the international market while exporting and at the same time makes the imports more costly. So an increase in exchange rate has a favorable impact on international competitiveness of the industry and downward movement has the opposite effect. There was a large difference between the official exchange rate and shadow exchange rate during the mid-80s and least after the devaluation in 1991.

The impact of changes in these parameter values on the value of NPCs is different in terms of direction and magnitude for different products. The increase in domestic market price resulted in upward movement of NPC value, thereby reducing the competitiveness of the industry and the downward movement of price has a positive impact. The increase in exchange rate and international price of dairy products increases the competitiveness of industry quite significantly by reducing the values of NPCs under all the cases. However, international price of dairy products is the most important factor, which affects the competitiveness of Indian dairy industry. Since the international prices of dairy products and exchange rate are highly volatile and are outside the direct influence of government and domestic industry, the only way to increase the competitiveness of the Indian industry is through reducing the domestic prices. Therefore, in order to achieve long-term competitiveness productivity increase and/or cost reduction is a must. Since milk yields in India are very low, therefore, there is a need to improve productivity and efficiency in production as well as processing sector to

remain competitive in the globalizing world and for that we need to undertake major domestic policy reforms.

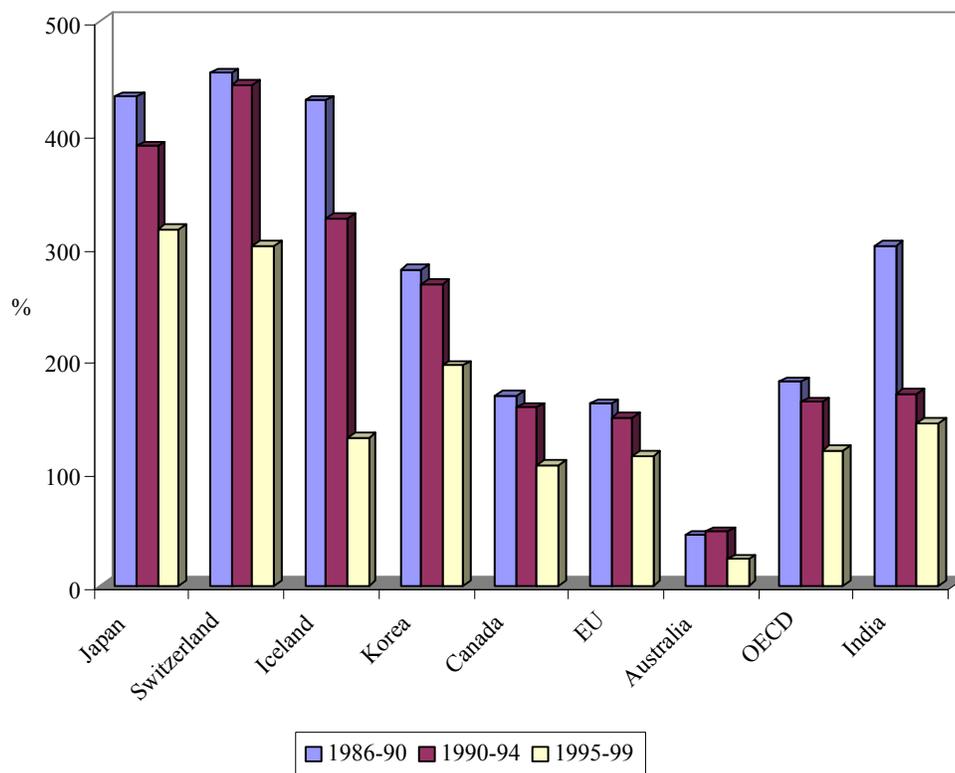
INTER-COUNTRY COMPARISONS OF NPCs IN DAIRY SECTOR

We have also culled out similar incentive indicators (NPCs) for other important milk producing/consuming countries for the period 1990-94 and 1995-99 from OECD publication (OECD, 2001) and compared with Indian sector estimates (Figure 14). The results are quite interesting.

Japan stands at the top with highest protection (316% in 1995-99) accorded to its milk producers, followed by Switzerland (301%), Korea (195%) and 119.5 per cent for OECD region as a whole. India stands fourth with a NPC level of 144.6 per cent at the given world market prices. However, if we compare the NPC figures calculated at un-distortion world prices for India, the NPC value drops significantly, which is lower than Canada and the EU levels.

What this indicates is that dairy sector has been one of the highly protected sectors in the developed countries. This is brought out by comparing protection estimates of dairy products across different countries. There is, however, a silver lining during 1990s. The protection for dairy products in India has drastically come down and in commodities like SMP it has even become negative in some years during the 1990s. The high average NPCs for Indian dairy products like butter and butter oil reveal that under the liberalized atmosphere, this sector may face difficulties in adjustment.

Figure 14—Estimates of NPCs of milk for selected countries: 1986-90 to 1995-99



Source: OECD (2001); For India: Author's estimates

V. CONCLUSIONS AND POLICY IMPLICATIONS

Let us first recapitulate the central issues we set out to explore. It might be recalled that there were three issues, outlined earlier in this paper:

- i. Indian dairy sector survive in the new economic environment of globalization?
- ii. What should be India's strategies/options in international trade negotiations, given the distortions in the world dairy markets?
- iii. What sort of domestic policy reforms are required in the dairy sector, which could promote its competitiveness in globalizing world?

The dairy sector remains the most distorted and highly regulated particularly in the EU, US, Canada and Japan and government interventions play significant role in formulating world dairy policies and trade flows. The WTO AoA was expected to impose disciplines on the trade distorting domestic and import policies as well as export subsidies in the dairy sector, however, the experience shows that it has not yet led to strong changes in dairy policies and still remains highly protective. The high import tariffs, large export subsidies, and domestic supports are still part of the dairy policy around the world.

The results of indicators of effective incentives such as NPCs and EPCs suggest that, on an average, Indian dairy sector is competitive *only* if the export subsidies on dairy products by developed countries in general and the USA and the EU in particular are abolished.

It is also clear that development of Indian dairy sector during the last three decades especially the white revolution has been largely policy induced and has occurred in a closed economy environment. This situation is fast changing and India will find it difficult to maintain a closed economy framework due to commitments made to the WTO and domestic macro-economic reforms. As India moves towards globalization of agricultural sector, the success of white revolution in achieving self-sufficiency in milk production through millions of rural producers is likely to be threatened due to distortions in the world markets. Would this mean that smallholder producers in India lose prosperity they gained from white revolution? Should not government continue to safeguard the interest of milk producers and processors? What should be India's strategies in the international trade negotiations and more importantly domestic reforms? These are difficult questions as they have many dimensions. Some of India's options on trade policy front and domestic policy include:

On trade policy front India needs to negotiate for:

- Reduction and eventual elimination of export subsidies in dairy sector particularly by the EU and the USA; putting maximum ceiling on export subsidy per unit rather than on total value and volume of subsidized exports and restriction on carry forward and roll-over of un-used export subsidy provisions
- Reduction in import tariffs through Swiss formula/weighted average, increased market access, one type of duties either *ad valorem* or specific for all WTO member countries, and transparency in allocation of TRQs
- Collapsing all support boxes (green, amber and blue) into one box would eliminate/reduce the existing loopholes and bring rationale and structure to the

- Agreement and a common level of support say 5 percent or 10 percent should be allowed for all member countries
- Abrogation of “Special Safeguard Provision” or should be made available to all WTO Member countries
 - “*Sterilization Duty*” to neutralize export subsidy on dairy products till the end of 2003 when the "peace clause"⁸ will expire and after that these subsidies can be challenged under the WTO's Agreement on Subsidies and Countervailing Measures if it causes material injury to domestic dairy farmers. This requires a close watch and comprehensive analysis of the policies of major exporting countries with a view to take appropriate decisions at the right time.

More importantly, India need to set own house in order and undertake major domestic policy reforms in the following areas:

- India should have an effective and efficient market intelligence system to monitor developments in the world markets (price, subsidy levels, demand and supply) and link import tariffs to world prices (variable tariff within bound rates of duty)
- Milk and Milk Products Order (MMPO) was introduced with a view to have an “orderly growth” of dairy sector in the country. This is an opportune time to examine whether it has been able to achieve its objective or created obstacles in the development of the sector. The experience of last 10 years indicates that the

⁸ The WTO Agriculture on Agreement contains a “peace clause” in Article 13, which states that as long as the subsidizing country is meeting its reduction commitments or other criteria agreed to in the Uruguay Round, it is exempt from certain WTO challenges. If the peace clause is allowed to expire at the end of 2003, farm subsidy programs now protected could be challenged by governments as illegal under the WTO’s Agreement on Subsidies and Countervailing Measures if they cause material injury to domestic producers.

operation of MMPO was limited to the registration of processing units and issues relating to food safety, quality, and hygiene have been ignored completely.

Moreover, the domestic dairy sector has been opened up to the world markets hence there was no justification for restricting a fair competition through licensing in the domestic processing sector. However, the food safety, hygiene and quality issues need to be addressed through appropriate policy mechanism to ensure the consumers get safe milk and milk products.

- In most of the cases low milk productivity is due to inefficient system of provision of different inputs and/or services such as feeds and fodder, animal health care facilities, artificial insemination, which requires institutional reforms to make delivery/extension system more effective. The role of government, private sector, farmers' organizations, local bodies, NGOs, etc. needs to be re-defined in the light of new economic environment and make delivery of inputs and services more effective and efficient.
- Finally, even if tariff barriers, domestic support and export subsidies are reduced/abolished in the developed countries, the real challenge for Indian dairy sector would be from SPS and TBT related issues. In order to meet these requirements both domestically as well as in the world markets, modernization of supply chain starting from producer to end consumer is required. Is Indian dairy sector prepared for this? Will it be feasible/viable to adopt new technologies and practices (cold chain, HACCP) in view of smallholder production system and what would be impact of these changes on the structure of milk production and processing

sectors? These are some of the issues/questions, which have not been addressed in this paper and need an empirical investigation.

REFERENCES

- Agra Europe (2001), "*Milk Products Supplement, Monthly Statistics (various issues)*", Agra Europe, Kent, UK.
- Andrews, N.; I. Roberts, I., and S. Hester (1994), "The Uruguay Round Outcome: Implications for Agricultural and Resource Commodities", in *Outlook94, Proceedings of the National Agricultural and Resource Conference*, Canberra 1-3 Feb., Vol.1, World Commodity Markets Trade, ABARE, Canberra, pp.171-179.
- Balassa, Bela, and D.M. Schydlosky (1972), "Domestic Resource Costs and Effective Protection Once Again", *Journal of Political Economy*, Vol. 80, pp.63-69.
- Central Statistical Organization (CSO, 2001), "*National Accounts Statistics, 1999*", Department of Statistics, Ministry of Planning, Government of India, New Delhi.
- Corden, W. Max (1971), "*The Theory of Protection*," Oxford University Press, London.
- European Commission (1997), "Situation and Outlook – Dairy Sector", CAP 2000 Working Document, Director General for Agriculture (DG VI), European Commission, Brussels.
- European Commission, 2000. *Prospects for Agricultural Markets 2000 - 2007*. Brussels.
- FAPRI, 2001. *World Agricultural Outlook*. Iowa State University – University of Missouri-Columbia.
- Food and Agriculture Organization (2000), "*Commodity and Market Review 1999-2000*", Commodities and Trade Division, Food and Agriculture Organization of the United Nations, Rome.
- GOI (2001), "*Economic Survey 2000-01*", Economic Division, Ministry of Finance, Government of India, New Delhi.
- GOI (2002), "*Economic Survey 2001-02*", Economic Division, Ministry of Finance, Government of India, New Delhi.
- Government of India (GOI, 1999), "*Basic Animal Husbandry Statistics 1999*", Department of Animal Husbandry & Dairying, Ministry of Agriculture, Government of India, New Delhi.
- Government of India (GOI, 2000), "*Agricultural Prices in India (various issues)*", Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, New Delhi.

- Gulati, Ashok.; James, Hansen, and Garry Pursell (1990), "Effective Incentives and India's Agriculture: Cotton, Groundnuts, Wheat and Rice", *Policy, Planning and Research Working Paper No. 332*, The World Bank Washington, D.C.
- International Agricultural Trade Research Consortium (IATRC, 2001), "Export Competition: Issues and Options in the Agricultural Negotiations", *Commissioned Paper Number 15*, International Agricultural Trade Research Consortium, St. Paul, Minnesota.
- National Commission on Agriculture (NCA, 1976), "*Reports Covering Animal Husbandry (Part VII) and Statistics (Part XIV)*", Government of India, Ministry of Agriculture and Irrigation, New Delhi.
- OECD (2001), "*Agricultural Policies in OECD Countries: Monitoring and Evaluation, 2001*" Organization for Economic Cooperation and Development, Paris, France.
- OECD (2001), "*The Uruguay Round Agreement on Agriculture: An Evaluation of its Implementation in OECD Countries*" Organization for Economic Cooperation and Development, Paris, France.
- Saxena, Rakesh (2000), "Dynamics of Demand for Milk in this Millennium" Paper presented at the *XXX Dairy Industry Conference*, Calcutta, December 8-9, 2001, pp. 32-47.
- Sharma, Vijay Paul (2000), "Assessing the Effects of the WTO Agreement on Indian Dairy Industry: What Can We Learn from Past Five Years?", *Indian Dairyman*, Vol. 52, No. 11, November, pp. 7-26.
- Shukla, R.K. and S.D. Brahmanekar (1999), "*Impact Evaluation of Operation Flood on Rural Dairy Sector*", National Council of Applied Economic Research, New Delhi, pp. 58-60.
- Taylor, Daphne S. and P. Truman Phillips (1991), "Food-Pricing Policy in Developing Countries: Further Evidence on Cereal Producer Prices," *American Journal of Agricultural Economics*, Vol. 73, No. 5, pp.1036-1043.
- USDA/ERS, (1999) "*The EU's CAP: Pressure for Change*," Working Research Paper No. 99-2, U.S. Department of Agriculture, Economic Research Services, Washington, D.C.
- USDA/FAS (2001), "*Dairy, Livestock and Poultry Division, World Dairy Prices (various issues)*", U.S. Department of Agriculture, Foreign Agricultural Services, Washington D.C.

USDEC (1999), "*World Dairy Markets and Outlook*", Vol. 4, No. 4 (Special Issues), September-October 1999, United States Dairy Export Council, Washington D.C., pp. 2A-2B.

World Trade Organization (WTO, 1997), "Signatories Terminate WTO Plurilateral Agreements on Meat and Dairy Products", WTO Press Release No. 78 (September 30, 1997).

World Trade Organization (WTO, 2000), "*Tariff and Other Quotas, Background Paper by the Secretariat (G/AG/NG/S/7)*", World Trade Organization, Geneva, May 23, 2000.

World Trade Organization (WTO, 2000), "*The Effects of the Reduction Commitments on World Trade in Agriculture, Statistical Background Paper by the Secretariat (G/AG/NG/S/11)*", World Trade Organization, Geneva.

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