POLICY
PAPER
23

Export Potential of Dairy Products

NAAS

NATIONAL ACADEMY OF AGRICULTURAL SCIENCES, INDIA
December 2003

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Introduction

Dairy development in India has been acknowledged the world over as one of the highly successful programmes. Dairy sector is the single largest contributor of agricultural sector to India's gross domestic product, with its annual value exceeding Rs. 100,000 crores. India has emerged as the largest milk producer in the world, with a record level of 84.6 mt during 2001-02, while the world's total estimated milk production during the same period is 584 mt. The milk production in India, accounts for more than 14 per cent of the world and 57 per cent of Asia's total production. According to FAO estimates, the world milk production has declined by 2 per cent in the last three years, while milk production in India has increased by 4 per cent. Having attained self-sufficiency in foodgrain production, there is a need to plan for strategic diversification of Indian agriculture to ensure sustainability and nutritional adequacy. Diversification of Indian agriculture focused on dairying and export of dairy products represents excellent potential leading to prosperity of the farming community representing 65 per cent of the population.

With 198 million cattle and 86 million buffaloes, India has the largest population of milch animals in the world. These livestock constitute more than 50 per cent of the buffaloes and 20 per cent of the cattle in the world. Although number of livestock is large, average milk production is far below their genetic potential. With a wellcrafted strategic approach, this huge animal wealth could be utilised in right perspective for enhancement of milk production without many incremental inputs. In contrast, a small rise in milk production requires intensive inputs and crossing of genetic barriers in advanced countries of the world, where milch animals are utilised to produce milk at their maximum potential. With a modest effort towards managing increased milk production, India would match/exceed the milk production of major players of international trade in dairy commodities. It is this potential that can catapult India as a major dairy exporting country on global basis. A nation-wide programme for prevention and control of animal epidemics, and creation of diseasefree zones coupled with efficient delivery of artificial insemination network will have tremendous impact on improving the productivity of milch animals. This, in turn, would strengthen India's entry into the global milk products market, as well as improve the quality and viability of the entire Indian dairy industry.

Unlike other milk producing countries, 54 per cent of India's milk comes from buffaloes, which is endowed with unique processing qualities. Buffalo milk is creamier, whiter, and richer in fat, SNF, minerals like Ca and P, besides possessing relatively higher levels of physiologically significant bio-immune and extranutritional factors. These unique processing attributes render buffalo milk especially suitable for commercially important dairy products such as Mozzarella cheese, cream, butter, dairy whiteners, *paneer, khoya*, etc. India can emerge as the leading supplier of these products in the world market. Buffalo milk fat is superior with regard to less cholesterol and has more tocopherol, which is a natural antioxidant. Indian dairy industry has to derive maximum benefits of the uniqueness and positive virtues of buffalo milk to obtain the competitive edge in the global dairy market.

Indian agriculture is essentially a 'crop-livestock production system', where crop residues are fed to the milch animals. Feeding cost being the main determinant of the cost of milk production, India is highly competitive against the industrially advanced countries,

where stall-feeding is practiced. Besides this, dairy farmers utilise family labour available in their own household for milk production activities. Due to low labour cost, the cost of milk production is significantly lower. The most important strength of Indian dairy industry is its cost competitiveness. Today, India either matches or surpasses countries like New Zealand, Australia and Argentina as the cheapest producer of milk on global basis. Overall, 70 per cent of world's milk is more expensive than Indian milk.

India is located amidst perennially milk deficit countries in Asia and Africa. Major importers of milk and milk products are Bangladesh, China, Hong Kong, Singapore, Thailand, Malaysia, Philippines, Japan, UAE, Oman, and other Gulf countries located in close proximity to India. China, India and Indonesia alone account for more than 40 per cent of the world's six billion-plus population. Economic growth and changes in dietary preferences in the Southeast Asian countries have stimulated consumption of dairy products, even though it is not a part of their traditional diets. Growth of quick service restaurants (QSRs), particularly pizza chains, and growing bakeries and other food processing industries also increase the demand for cheese and other dairy products. India, thus, enjoys a strategically advantageous geographical location in terms of international trade of dairy products.

Global opportunities available to the Indian dairy industry arise primarily out of the availability of a large quantity of competitively priced milk. As the Indian dairy sector produces milk without any subsidies, the country stands to gain from the fair implementation of WTO agreements. India needs to prepare itself to access the markets of developed countries such as the European Union, USA and Japan, and has already an edge with regard to the deficit regions of South and Southeast Asia, Middle East and Africa for supply of dairy products at competitive price. However, quality of milk produced in India falls below the internationally accepted standards. Development of awareness, mindset and commitment on improving the quality of milk is necessary. Intensive efforts are needed to meet the WTO's Sanitary and Phytosanitary (SPS) and Technical Barriers of Trade (TBT) agreements and Codex Alimentarius Commission guidelines on quality and safety. In order to propel the export of milk and milk products, there is an urgent need to discuss and institutionalise the various provisions of SPS and TBT agreements along with international standards of Codex as reference points.

Export Potential of Dairy Products: Format and Theme Setting

The National Academy of Agricultural Sciences sponsored a two-day Session[*] on 'Export Potential of Dairy Products' to discuss the issues and challenges confronting Indian Dairy Industry and came out with some tangible recommendations for use of the planners and policy makers of our country.

[*] *Session held at the National Academy of Agricultural Research Management (NAARM), Hyderabad under the Convenership of Dr. B.N. Mathur, Director, NAARM, Hyderabad, August 22-23, 2003. About 30 participants representing research institutes, technical consultants, industry, and public sector organisations participated in the discussion with the major objective of developing a policy document to sensitise various administrators and planners in the country to the export potential of dairy products as well as to the need for developing a suitable infrastructure and appropriate human resource for promoting the exports.*

The session was organised under the following four[#] major themes:

1. Export of dairy products under WTO regime—prospects and strategies.
2. Economic and policy considerations for infrastructure development and international marketing.
3. R&D, product diversification and HRD in promoting export of dairy products.
4. Quality management for global market.

Some of the major recommendations emerging from intensive discussions that need to be considered by the related Government Departments and the Indian Dairy Industry to fully exploit the vast export potential available for the dairy products under the WTO regime are summarised below.

Recommendations

1. Policy Support

1.1 International Trade

In order to cope with the trade distortion policies of developed countries within the provisions of the WTO compulsions, India needs to intensify its efforts to develop national policy for encountering the effects of subsidies, reduction in import tariffs, and adopting selective mechanisms to reduce support on items.

Recommendation: Setting up of a high powered monitoring and steering group, which is empowered to fund, and support research studies for policy interventions. This agency would monitor trade developments and suggest timely interventions by the government to offset any negative impact on livelihoods of dairy farmers in India. This should also focus on issues of total or gradual withdrawal of subsidies in individual countries for exports from India, tariffication, preshipment and anti-dumping provisions, and on modalities for negotiations at WTO meetings and also for preparing cases at WTO Dispute Settlement Panel (DSP).

1.2 Demand Generation

In the competitive environment, initiatives need to be taken to create awareness regarding the unique functional and therapeutic attributes of buffalo milk products as well as interest in the traditional Indian dairy products with the objective of export promotion.

[#] *Theme papers providing the background materials and highlighting the issues that need to be addressed were presented in four Technical Sessions by experts having wide experience and insights into the potentials and problems of dairy sector. Under each technical session, the presentations were followed by brainstorming various issues associated with the particular theme taken up for discussion. The programme format provided ample opportunities for the delegates from the academic, research, production, processing, marketing, and export promotion institutions in the public and private sector of Indian dairy industry to raise relevant issues and come out with meaningful suggestions, in the form of recommendations, to promote export of dairy products. The major issues that require immediate attention of all those agencies concerned with the export promotion of dairy products are consolidated and presented systematically in this document.*

Recommendation: Through aggressive media campaigns/food festivals/market intelligence, promote interest and create market for traditional Indian dairy products abroad.

1.3 Strategic Alliance

In order to compete globally for the export of dairy products, it would be strategically advantageous to establish synergistic alliances among the exporting/importing countries (on the lines of Australia and New Zealand, who fiercely compete with each other but enter the world market as strategic partners).

Recommendation: Diplomatic initiation should be made for forging strategic partnerships at the international level for the export of dairy products. In this context, India could play an active role with the dialogue initiated by it with the 22 member countries of the Austral asian Animal Productivity Society (of which India is also a member) for strategic alliances towards export of animal products to importing countries in Asia, Oceania, Africa, and South America, as well as SAARC countries.

1.4 Marketing

Strategic marketing of dairy products needs to be supported through innovative policies that encourage both multilateral and bilateral negotiations with importing countries, and thus, help to regulate and monitor production conforming to international standards. Effective strategy will also require availability of national and international databases to inform on assessments of production, prices, production conditions, consumer preferences, risks, and the quality of dairy products. Such databases will also support negotiations at WTO and bilaterally with importing countries so as to ensure that SPS/TBT measures are based on sound scientific principles.

*Recommendation***:** National and international databases of production, production conditions, prices, quality requirements, consumer preferences, and demand for dairy products to identify niche markets, and information on strategic marketing of dairy products and bilateral and multilateral negotiations in the dairy sector should be developed.

Agencies like EIC and CITA, and the Ministries of Agriculture and Commerce can play a vital role in this direction.

2. Infrastructure Requirements

In view of the impending urgency to conform to the international quality parameters and non-tariff barriers, the potential exporters of dairy products need to be aware of the stipulated requirements of the SPS and TBT agreements and the development of necessary mechanisms/infrastructure to cover possible risks.

Recommendation: Enactment of “Central Prevention of Infectious and Contagious Diseases in Animals” Bill, enforcement of stringent quality considerations, conduct of research on improving quality and shelf life of traditional Indian dairy products, and development of infrastructure for clean milk production. Implementation of HACCP would be made mandatory to all the export units under the supervision of a coordination agency.

Coordinated efforts of EIC, CITA and the Ministry of Agriculture are necessary for this purpose.

3. Human Resource Development Efforts

Promotion of dairy exports in the present context requires planning of competent human resource with expertise on understanding of WTO regime and various opportunities provided by it for the Indian dairy industry.

Awareness Creation

All persons associated with production, processing and export of dairy products need to be sensitised to the newly emerging issues concerning WTO and their implication on the Indian dairy industry.

Recommendation:

i) Awareness programme for the producers and exporters on the implication of trade agreement under the WTO regime on the Indian dairy sector should be effectively organised.

ii) At the institutions of higher learning, such as the IIMs, training academies, etc., long- and short-term courses may be introduced for training of the bureaucrats and technocrats on policy planning.

Agencies associated with trade like CII and the Dairy Industry, and enforcement agencies like EIC and CITA should take active part in this awareness creation campaign.

Infrastructure Development for International Marketing: Economic and Policy Considerations

In order to compete in the global market, the exportable dairy products should be made cost effective and of high quality meeting the international standards. Production of quality products in a costcompetitive manner requires certain basic infrastructure facilities for production, processing, packaging, handling, and marketing. Major constraints that hamper export of dairy products of internationally acceptable quality include infrastructure related problems like inadequate transport (road, rail or ports), power, cold storage, packaging facilities, etc. While India now has a few of the state-of-theart dairy plants, comparable to the very best in the world, a majority of them are outdated and worn-out. They need to be upgraded to meet the emerging needs. Besides restructuring of the existing infrastructure, it also becomes necessary to create new infrastructure for meeting certain specific requirements. Some of the major concerns associated with either strengthening of the existing or creation of new up-to-date infrastructure facilities, that are necessary for ensuring the quality of international standard, are presented below.

1. Policy Support

Suitable economic and policy considerations relating to infrastructure development become necessary for promoting export of dairy products by the industry.

Recommendation:

i) Export responsive infrastructure development policies, and increase in investment by public and private sector as partners are required. For this purpose, Export Promotion Council needs to be established.

ii) Stable and long-term infrastructure investment policies by way of providing 10 years tax holiday are necessary to promote export of dairy products.

iii) In order to facilitate export of milk products by the dairy industry, single window clearance system for export to be developed on a priority basis.

In order to implement these recommendations in a more meaningful way, agencies like EIC, CITA and IDA should initiate appropriate action.

2. Infrastructure Requirements

There is an acute need to set up demonstration units at the rural level to educate the farmers regarding the recommended good practices for clean milk production consistent with the international sanitary and phytosanitary requirements of WTO.

2.1 Model Villages

Since the animal breeds and feeding practices differ from region to region, there is a need to establish model villages focused on dairy development/diversification of agriculture in each of the 16 agroclimatic zones of the country. These model villages could, in turn, serve as the nuclei for orchestrating future 'integrated rural developmental process' and address wider issues of education, rural hygiene, drinking water, immunisation, social issues, gender issues, e-communication, environmental issues, sustainable development, etc. These model villages would feature community training centres for model breeding, housing, feeding, health care, machine milking, milk chilling, as well as for roads, water, power, and hygiene in the villages to produce and handle quality milk.

Recommendation:

i) Develop regionally differentiated, socially acceptable, economically competitive, ecologically sound milk production systems for the 'crop-live stock production system' prevalent in India.

ii) Model villages be established in the 16 agroclimatic zones of the country focused on dairy development. A community centre would feature model housing, machine milking, milk chilling, veterinary services, training facilities for ensuring clean milk production, and promote dairy development programmes.

2.2 Transportation from Farm to Dairy Plant

While transporting milk from the production site to the factory, care should be taken to avoid spoilage by providing appropriate cooling facilities as followed in case of horticultural produce.

Recommendation: The dairy plants should ensure that within three hours of milking, milk is pooled and chilled to 4°C and transported under refrigerated condition to the processing plants.

3. Human Resource Development Efforts

Through appropriate training programmes, the manpower engaged in quality control and marketing should be developed to meet the emerging challenges.

3.1 Milk Collection

Group efforts for the collection of milk in a more hygienic way should be promoted.

Recommendation: Networking of women groups for regional milk collection centres by spreading the Amul model, could be adopted.

3.2 Quality Certification

Steps need to be taken to obviate the multiplicity of agencies to issue quality certification.

Recommendation: Workshop for the exporters and certifying agencies to focus on single window system for quality certification should be put in place.

3.3 International Marketing

Specialised skills are required for becoming an exporter of dairy products in the face of highly competitive global market.

Recommendation: Concerted efforts should be made to train the marketing personnel on attractive packaging and labelling to compete globally. Most importantly, the exporters should be trained in marketing management, particularly on export management including various export laws and regulations.

Institutions such as EIC, CITA, NDRI and NDDB, should be encouraged to take up these activities in a concerted manner.

R&D Support for Product Diversification

Since the establishment of GATT, way has been paved for expanding the international trade of agriculture/dairy commodities. Most of the global dairy products exporting countries have been planning crucial strategies for milk production aimed at reducing subsidies for dairy farmers in a phased manner. Over the years, considerable expertise has been developed in dairy products on strengthening internal economies *vis-à-vis* international marketing. For instance, the East European countries have consciously reduced milk production by 30 per cent compared to 1970 levels. On the other hand, France has maintained steady growth, while reducing the number of dairy cattle. In view of the glut in butter stocks, Australia and Israel have been breeding dairy cattle for milk with low fat content.

1. Policy Support

For the dairy sector to become globally competitive by: i) bringing down the cost of production; ii) maintaining the quality to meet international standards; iii) creating a niche for dairy products of Indian ethnic origin having greater demand in the Western countries; and iv) developing dairy products from genetically modified processes, it becomes imperative for providing the necessary R&D support.

1.1 Globally Competitive Dairy Sector

At the present levels of quality of dairy products, the dairy sector is cost-competitive only if all the subsidies given by the developed countries are eliminated. Improvements in quality to match international standards will raise the cost of production, unless efficiencies of processes are also improved. A primary requirement of research is, therefore, to reduce the cost of production, raise process efficiency and simultaneously, improve the product quality.

Recommendation: The competitive ability of the dairy sector should be increased through research that leads to increase in productivity of raw milk, improvement in quality and efficiency, and reduction in costs, at all levels of the milk chain.

1.2 Product Diversification

Demand for dairy products is influenced by a number of dietary, social, economic and industrial factors, which tend to be unique for any importing country. Indian dairy industry needs to develop market intelligence for the type of dairy products that have potential demand abroad. Product diversification plans must match the anticipated demands of the market abroad. Concerted R&D efforts are required to provide necessary support to the industry. Considerable scope exists for the application of biotechnology to innovate a wide range of dairy foods having unique nutritional and therapeutic attributes. Likewise, a wide range of food ingredients having unmatched functional properties may be derived from milk for application in inimitable food formulations.

Recommendation:

i) Drive towards self-reliance in R&D for developing cuttingedge technologies targeted at export promotion should be promoted.

ii) R&D for diversification of dairy products with emphasis on nutraceutical, functional and therapeutic value through biotechnological applications represents newer opportunities for creating niche markets.

iii) Dairy foods with biofortification could be developed to overcome the problem of 'hidden hunger' or inadequate levels of micronutrients such as iron, zinc, iodine, and vitamin A, as health foods and tools for public health among the poor.

1.3 Monitoring Quality

Under the SPS/TBT agreements, it is necessary to constantly monitor the quality of raw milk, production conditions and the quality of products for pesticides, pathogens and

veterinary drugs. This requires quick and accurate tests that can be carried out by monitoring agencies. The present testing procedures are cumbersome and time consuming. Research must, therefore, focus on developing quality-testing kits for application under field conditions to meet urgent needs of the industry.

Recommendation: Intensive R&D efforts need to be directed for the development of sensitive field-testing kits for on-the-spot detection of objectionable contaminants of chemical or microbial origin.

1.4 Enhancement of Shelf life

For international trade/marketing/distribution of dairy products and shelf life considerations are of vital importance, since they need to stay fresh during shipping and storage. This requires research on improving the shelf life and product packaging.

Recommendation: Innovative technologies need to be developed, utilising, preferably, innate anti-microbial components of milk coupled with natural metabolites of microbial/biotechnological origin which represent newer opportunities for the enhancement of shelf life of dairy products intended for export markets.

1.5 Traditional Indian Dairy Products

A niche global market has strongly emerged for ethnic Indian dairy products. Besides the NRIs, estimated to be 15 million, certain developed countries (mainly Canada, Australia, New Zealand and UK) have already taken major initiatives to cater to this market. Indications are, that the market is fast growing with considerable future potential. Large populations of Indian origin settled in Oceania, Middle East, Western Europe, and North America represent a lucrative export market of over US $ 1.5 billion. There is an opportunity to take advantage of this niche market by developing dairy products of Indian ethnic origin meeting the quality and standards required for the global market.

Recommendation:

i) A niche market for Indian ethnic dairy products should be developed through research on their quality parameters, manufacturing processes, preservation, and packaging. ii) There is a need to develop an illustrated catalogue enlisting the physical, rheological, chemical and microbial profile of ethnic Indian dairy products for developing product standards for export and IPR related issues.

iii) Initiatives need to be taken through prompt R&D support coupled with government bodies on food legislation (PFA, BIS) to develop appropriate Codex standards for certain ethnic dairy products that have immediate export market (*viz*., *rasogulla, gulabjamun, burfi, peda, shrikhand*, etc.).

iv) Pilot plant facilities may be established for the development of equipments, processes, packaging systems, and quality assurance systems for the dissemination of R&D on ethnic Indian dairy products having stake of industry, equipment manufacturers, packaging material manufacturers, and R&D institutions.

v) Special attention needs to be paid to the R&D for improvement of the shelf life, consistent with the requirement of the marketing and distribution network at international level in conjunction with the packaging conforming to the international standards.

1.6 Genetically Modified Dairy Products

Dairy products/food ingredients from genetically modified microbial processes are fast entering and are being increasingly utilised by the process industry. Biotechnology and international trade are at the forefront of global debate, as United States and European Union continue to hold dramatically different positions over this contentious issue. Differing trans-Atlantic perceptions on food safety keep developing countries from achieving food security and benefiting from free trade. There is a need to resolve this issue in respect of their safety from the perspectives of both public health and the environment.

Recommendation:

i) Suitable regulations for dealing with genetically modified dairy products should be developed through research on their biosafety aspects, both from public health and environmental perspectives.

ii) There is need for a Science Summit of the representatives from all relevant sectors to resolve the issues concerning international trade of dairy commodities.

Necessary legislative R&D support to carry out all these activities should be provided by institutions like IFPRI, Codex, WTO, NDRI, NDDB, and SAUs.

1.7 Anticipatory Research

Importing countries, particularly the developed countries, are likely to increasingly resort to non-tariff barriers to restrict trade in dairy products, as evidenced by the deliberations of the Cancun meet of September, 2003. It is necessary to be prepared for and address such developments through futuristic research on market developments, consumer preferences and country policies with respect to dairy products.

*Recommendation***:** The dairy sector should be prepared to deal with changing strategic deployment of non-tariff barriers by developed countries through futuristic research on global trends in market development and access, environmental and trade issues, and consumer preferences.

Requisite R&D support to carry out all these activities needs to be provided by institutions like NDRI, NDDS, and SAUs.

2. Infrastructure Requirements

In order to create potential market for newer dairy products, necessary infrastructure facilities need to be developed.

2.1 Demonstration Centres

For demonstration and dissemination of newer technologies as well as for manpower development, suitable infrastructure is required.

Recommendation: Semi-commercial Technology Demonstration and Dissemination Centres be established for the dissemination of newer products, processes and equipment, as well as for the training of dairy personnel towards export promotion of dairy products.

Agencies like EIC and CITA should develop suitable agendas to take necessary steps for fulfilling this strategic requirement.

2.2 Packaging Systems

Extensive use of plastic materials for packaging dairy/food products poses increasingly insurmountable environmental problems for disposal after use. Furthermore, options for packaging materials/equipments are exceedingly narrow for the indigenous dairy sector, besides being very costly. New packaging concepts/biodegradable materials aimed at product protection, enhanced functionality and food safety, need to be developed as essential components of product development, especially for the export market.

Recommendation:

i) Depending on product range, operating and marketing priorities, and consumer preferences, appropriate packaging systems need to be developed.

ii) There is a need to evolve environmental-friendly, biodegradable packaging materials to meet the demands of future, through intensive financial and scientific inputs.

iii) In this context, functional linkages need to be established between the dairy industry, packaging industry, packaging machine manufacturers, and R&D organisations by establishing Technology Development and Dissemination Centres.

Creation of new infrastructure facilities and the strengthening of existing facilities require support from the financial institutions, such as NABARD, IDBI, EXIM Bank, and IDA.

3. Human Resource Development Efforts

Technical personnel associated with production, processing and business of dairy products need to be exposed to newly emerging issues concerning WTO regime. Also, they should be equipped with newer knowledge and be given opportunities to develop and upgrade their skills through various kinds of awareness creation and training programmes, both short-term and refresher courses, on a continuing basis. Concerted efforts should be made to develop and implement appropriate HRD strategies to meet the needs of various groups of people.

3.1 Curriculum Modification

To keep pace with the rapidly changing global scenario in the processing industry, relevant modification in the curriculum of Dairy Education programmes should be effected.

Recommendation: The curriculum should be strengthened with focus on quality management, information technology, and agribusiness with special emphasis on international trade and marketing.

3.2 Awareness Creation

Awareness programme should be planned for imparting new knowledge in the latest global developments/trends in the dairy sector.

Recommendation: Training programmes on hygienic milk production, processing, packaging, and marketing should be organised.

3.3 Skill Development

For industrial application of modern/innovative technologies, the manufacturers should be equipped with necessary knowledge/skills through well-structured training programmes.

Recommendation: Training the manufacturers by exposing them to the concept of computer integrated manufacture for achieving TQM through statistical quality control (SQC)/statistical process control (SPC).

3.4 Development of Business Ethics

Paradoxically, the image of Indian dairy industry is very low among the trading countries. This is a very serious issue, which needs to be addressed through well-orchestrated campaigns at the national level. Personnel engaged in export should be encouraged to bestow attention to ethics and value system while doing business.

Recommendation: Training of personnel in business and enforcement agencies in business ethics and developing internal value systems that might enforce their implementation.

3.5 Interinstitutional Linkage

In order to bring about synergism in various HRD efforts, strong working partnerships need to be built among the agencies concerned with export of dairy products.

Recommendation: Synergistic/supportive linkages between the public sector R&D institutions and industrial sector should be further strengthened by offering contract research/regular training in production and processing technology/agribusiness including manufacturing and marketing. Besides, interinstitutional task force is to be established for evolving policy guidelines and maintaining effective strategic markets at global level.

All these suggestions are possible to realise with the active participation of institutions like NDRI, SAUs, EIC, CITA, and Dairy Industry.

Quality Management for Global Market

Consequent to the WTO Agreement on Agriculture, export subsidies and tariff barriers are being reduced on imports by all the member nations. However, non-tariff barriers are being increasingly imposed to restrict trade through strategic deployment of the WTO Agreements, SPS measures, TBT. The SPS Agreement recognises the rights of national governments to restrict trade to protect human, animal or plant health by requiring the signatories to provide clear, scientific evidence of food safety standards, as well as standards for animal and plant health. The TBT Agreement includes those provisions not covered by the SPS Agreement to restrict trade so long as they are justified by a legitimate objective i.e. national security, safety for consumers or environment, animal and plant health, or fairness of trade. The measures must be transparent and in compliance with international standards. Price and quality, largely influence the global market for dairy products. The latter is also a key factor in strategically deploying the SPS and TBT Agreements by the developing countries to restrict imports.

In principle, the SPS Agreement authorises only those measures that are based on an objective risk analysis and rejects those that constitute a 'disguised trade restriction' or discrimination between the members. The 'Principle of Equivalence' is central to this Agreement. By this principle, a WTO member shall accept other countries' SPS measures as equivalent, even if they differ from its own, or other members trading in that product. The exporting member will need to demonstrate to the importing member that its measures meet the latter's level of SPS protection. Both SPS and TBT do not directly involve the WTO in setting standards or their enforcement. Despite the multilateral WTO Agreements, it becomes necessary for the exporting countries to negotiate with individual nations on specific product quality requirements.

The SPS and TBT Agreements necessitate that issues relating to quality of dairy products need to be addressed across the entire milk chain—from production of raw milk to its processing and marketing, both in raw form as well as industrial dairy products. Codex standards specify maximum permissible limits for chemical contaminants including heavy metals (lead), mycotoxins, pesticide residues, and veterinary drugs in milk and milk products. It recommends the General Principles of Food Hygiene (GPH) based on the Hazard Analysis and Critical Control Points (HACCP) system for milk production and processing. The PFA standards are mandatory, that prescribe minimum compositional standards and maximum levels of contaminants for pesticide residues, heavy metals and aflatoxins. The BIS prescribes standards and guidelines for dairy products and processes, and also, for food hygiene and safety. But these are, however, not mandatory.

Milk production in India spreads over several million diverse and dispersed small farms. Much of the dairy industry in India is in the small-scale cooperative sector. Within the dairy sector, there is a need for regulation to ensure implementation of the GHP and HACCP systems for TQM. But these are effective largely for keeping microbiological content within permissible standards. For controlling the chemical contaminants (pesticides, heavy metals, etc.) a large scale environmental clean-up and investment in rural infrastructure (clean water, power, etc.) would be required. Similarly, animal health issues would also need to be addressed at a much broader scale than that of the dairy industry by ensuring proper preventive and quarantine measures through regulation. Some

of the important quality related issues requiring immediate attention of producers, exporters and policy makers are described below.

1. Policy Support

Policy guidelines to tackle issues relating to environmental protection and animal health are required to ensure increased export of dairy products.

1.1 Environment

The quality of raw milk is the primary concern in the export of dairy products to overcome non-tariff (SPS/TST) barriers. This will be determined by the feed quality, sanitation, environmental pollution, and the availability of power and clean water. The quality standards of PFA need to be harmonised with those of the Codex standards that govern the international trade of dairy products. It is necessary to sensitise the Environmental Protection Agencies on the implications of the WTO Agreements related to dairy sector.

Recommendation: The Environmental Protection Agencies should be sensitised to the urgency of the needs of the dairy sector to develop and implement environmental regulations that may effectively lead to lowering the quantities of pesticides and chemical contaminants in raw milk to internationally acceptable standards.

1.2 Animal Health

The present regulations and programmes for animal health aim more at curing than prevention of diseases. Preventive care is important for the export of dairy products, as the SPS Agreement includes clauses that provide for ensuring that areas from where the dairy products are exported are pest- and disease-free. This would not be possible to achieve on a countrywide basis, as the dairy sector is dispersed over millions of small farms across the entire country. It is, therefore, necessary to create Export Promotion Zones in the country that can conform to the international standards of quality measures. Effective monitoring and enforcement of environmental standards would also be possible in such zones.

Recommendation: Efforts should be made to identify and develop Export Promotion Zones for dairy products, which can be monitored and regulated to be relatively free from diseases and pests.

Agencies like NDRI, NDDB, IDA, EIC, and CITA should attend to these issues.

2. Infrastructure Requirements

In order to produce and market dairy products of international standard, certain infrastructural facilities need to be created, besides strengthening the existing facilities.

2.1 Monitoring Animal Health

The existing infrastructure for monitoring animal health is far too inadequate and does not meet the international norms. It needs to be augmented, modernised and networked to facilitate effective monitoring of contaminants in dairy products.

Recommendation: International standards for monitoring animal health, for at least the identified Export Promotion Zones, to begin with, in terms of number of veterinary supervisors, veterinary surgeons, veterinary clinics, and veterinary hospitals for the specified number of milch animals, needs to be imposed.

2.2 Monitoring Chemical Residues/Microbial Toxins

There is an increasing trend towards public awareness/concern towards deleterious effects of undesirable agrochemicals/veterinary drugs/microbial toxins in dairy/food products on human health. The Indian dairy industry needs to galvanise into action the strategies to dispel the adverse image of Indian dairy products, among countries abroad. This requires a meaningful review and new infrastructure through networking of public health laboratories, dairy plants and food-testing agencies in private sector. Besides, the existing laboratories need to be upgraded by creating necessary facilities for carrying out all the required tests.

Recommendations:

i) There is need to establish a National Surveillance/Monitoring Agency to carry out region-wise testing of milk and milk products for the presence of agrochemical residues/veterinary drugs/microbial toxins.

ii) Establishment of a few state-of-the-art labs, with appropriate accreditation to estimate contaminants, in different parts of the country would help the industry to ensure quality of dairy products of international standard.

2.3 Export Inspection Agency

Presently, the legislation enforcing authorities with responsibilities to regulate and maintain the quality of international standard (Codex) do not have adequate testing facilities. Apparently, there is an urgent need for establishing a network of quality control labs at the regional and national level.

Recommendations: At least, every district should have a lab for PFA enforcement, and every port should have a suitable lab for testing import/export consignments.

2.4 Rural Infrastructure

Clean water, adequate power supply and sanitation are important to implement the above recommendations.

Recommendation: Adequate rural infrastructure in terms of power, roads, clean water supplies, and sanitation, should be ensured at least in the Export Promotion Zones.

2.5 Quality Management

Globally, quality management systems like GMP, GHP, HACCP and ISO 9000, are being adopted by the dairy sector to assure the consumers of safe and high-quality dairy

products. The Ministry of Health in India has also recommended a programme on 'Food safety management through GHP, GMP and HACCP'.

*Recommendation***:** The Dairy industry should adopt TQM processes based on the Codex standards and integrate the GHP, HACCP and ISO systems into milk collection, processing, product packaging, storage, transport, and shipping of dairy products.

Necessary action may be initiated by agencies such as DAH, IDA, CITA, NDRI, and NDDB, to create the required infrastructure facilities.

3. Human Resource Development Efforts

For effective management of quality related infrastructure facilities as well as the quality management systems, it becomes necessary to develop the required manpower with relevant skills through appropriate training programmes.

Recommendation:

i) Training for skill development of people to effectively man various quality-testing laboratories attached to PFA, BIS, Agmark, CSIR, EICI, APEDA, ICMR, and NDRI, is required.

ii) Training of suitable manpower on quality management systems (QMS) such as good hygienic practices (GHP) and good manufacturing practices (GMP), and application of the concept and principles of sanitary and phytosanitary (SPS), and hazard analysis and critical control point (HACCP) systems throughout the food chain from the farmer to consumer, becomes important.

The responsibility to develop the required manpower may be entrusted to institutions such as NDRI, EIC and CITA.