SOUVENIR

National Workshop on Entrepreneurship Development in Dairy and Food Industry

at
National Dairy Research Institute, Karnal

December 23, 2005

Organized by
Dairy Technology Society of India &
National Dairy Research Institute, Karnal

Sponsored by: Department of Science & Technology
(Government of India)
SOUVENIR

NATIONAL WORKSHOP
ON
ENTREPRENEURSHIP DEVELOPMENT
IN DAIRY AND FOOD INDUSTRY

at
National Dairy Research Institute, Karnal

(December 23, 2005)

Compiled & Edited by:
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Dairy Technology Society of India
&
National Dairy Research Institute, Karnal

Sponsored by: Department of Science & Technology
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MESSAGE

The President of India, Dr. A.P.J. Abdul Kalam, is happy to know that the Dairy Technology Society of India and the National Dairy Research Institute, Karnal are jointly organising a National Seminar on Value Added Dairy Products on 21st and 22nd December, 2005 and also a National Workshop on Entrepreneurship Development in Dairy and Food Industry on December 23, 2005 at Karnal.

The President extends his warm greetings and felicitations to the organisers and the participating delegates and wishes the Seminar and the Workshop all success.

[Signature]
PRESS SECRETARY TO THE PRESIDENT
MESSAGE

Hon'ble Vice-President of India, Shri Bhairon Singh Shekhawat is glad to know that Dairy Technology Society of India, is organising a National Seminar on Value Added Dairy Products and a National Workshop on Entrepreneurship Development in Dairy and Food Industry during December 21-23, 2005.

Vice-President of India appreciates the sincere endeavours of the Society in the development of dairy industry in the country.

Vice-President of India extends his good wishes to the organisers and wishes the Seminar and the Workshop all success.

ASHOK ARYA

New Delhi
6th December 2005
MESSAGE

The Prime Minister is happy to know that the Dairy Technology Society of India and the National Dairy Research Institute, Karnal are jointly organizing a "National Workshop on Entrepreneurship Development in Dairy and Food Industry" in Karnal on 23rd December, 2005.

On the occasion the Prime Minister extends his greetings and good wishes to the organizers and participants for the success of the Workshop.

(S.N. SAHU)
MESSAGE

I am extremely delighted to know that the Dairy Technology Society of India and the National Dairy Research Institute, Karnal are jointly organizing the National Workshop on Entrepreneurship Development in Dairy and Food Industry at NDRI, Karnal on December 23, 2005. I understand that the theme of the workshop will cover emerging issues related to promotion of entrepreneurship in dairy and food industry.

Agriculture sector is the backbone of India’s economy in terms of income, employment generation and ensuring food & nutritional security. With milk’s contribution being the highest to the GDP amongst agricultural commodities, “Production by the masses” rather than “Mass Production” is the key to unplug the bright future prospects of the Dairy and Food Industry in India. The strength of Indian food and dairy industry lies in the availability of raw material, flexibility of product mix, consumer awareness for safe and nutritious foods and well-trained technical manpower. With economic liberalization, there are opportunities as well as challenges ahead, for this growing sector. Indian food and dairy industry can step forward through entrepreneurship, innovative approaches on technological and marketing front along with due emphasis on quality and ethical issues. I look forward to the recommendations of the National Workshop.

I convey my best wishes to the organizers for the success of the National Workshop.
MESSAGE

I am indeed delighted to learn that Dairy Technology Society of India, is bringing out a Souvenir on the occasion of “National Workshop on Entrepreneurship Development in Dairy and Food Industry” on 23rd December 2005. I hope the Workshop will focus on entrepreneurship development in dairy and food sector for accomplishing better organization, presentation and marketing of food commodities.

I am sending my best wishes for the success of the Workshop.

Yours sincerely,

(Subodh Kant Sahai)

Shri Alok Jha
Organizing Secretary
Dairy Technology Society of India
National Diary Research Institute,
Karnal-132 001
Haryana
Livestock and livelihoods are closely related in our country. The ownership of livestock is much more egalitarian. Also, women play a leading role in the dairy and food industry which are important both for nutrition and livelihood security. I am therefore happy that the Dairy Technology Society of India is organizing a National Workshop on Entrepreneurship Development in Dairy and Food Industry. I hope this workshop will lead to greater degree of entrepreneurship among young university students particularly from home science colleges, so that we can continue to maintain a position of leadership in the World in these areas of great importance to the health and work and income security of our rural families.

M S Swaminathan
MESSAGE

It is a matter of great pleasure to know that the Dairy Technology Society of India and National Dairy Research Institute are organizing the National Workshop on "Entrepreneurship Development in Dairy and Food Industry" on December 23, 2005.

Once a food deficit country, India is now among the largest producers of foodgrains, fruits and vegetables and milk in the world. India's agricultural export in the year 2003-2004 was about 13% of the national exports. However, there are some daunting challenges facing the sector which include low levels of productivity, infrastructure and declining investments.

The theme of the Workshop is most appropriate in view of the economic liberalization and changing consumer preference that have opened up new opportunities for product diversification in the dairy and food processing sector. It is hoped that the deliberations during the Workshop would result in formulation of recommendations to promote entrepreneurship development in dairy industry and thereby help in generating additional employment especially in the rural areas.

I wish the National Workshop a grand success.

Dated the 5th December, 2005
New Delhi
Dated: December 01, 2005

MESSAGE

I am delighted to know that Dairy Technology Society of India and the National Dairy Research Institute, Karnal are jointly organising a National Workshop on Entrepreneurship Development in Dairy and Food Industry on 23rd December, 2005 and have planned to bring out a Souvenir on this occasion.

It is a matter of appreciation that this workshop will provide a good opportunity to experts and researchers of the related fields of dairy and food industry to exchange latest developed ideas which are of immense value for the entrepreneurs in particular and the nation in general.

I wish the programme a grand success.

(P.L. Gautam)
MESSAGE

I am very happy to learn that Dairy Technology Society of India and National Dairy Research Institute, Karnal are jointly organizing a National Workshop on Entrepreneurship Development in Dairy and Food Industry to be held at NDRI from December 23, 2006.

The dairy and food industry is a fast growing sector in response to growth in the economy and significant changes in the dietary habits of the people. But the growth of industry has not been able to keep pace with the growing demand both in quantity and quality. Inefficiency is reported both in production and processing sub-sectors. If the industry has to largely benefit from the growth potential of the sector, better organization, presentation and marketing are to be given priority attention. In other words, enlightened entrepreneurship development is the key to success of dairy and food industry in the coming years. I am glad that the proposed national workshop which will be attended by a large number of delegates from dairy and food industry as well as academia from all over the country will deliberate on the main issues and opportunities and develop a road map for the accelerated development of the sector. Needless to mention that success of such efforts will hinge on how effective is the linkage between public and private sector and industry and academia.

I wish the workshop all success.

November 29, 2005

(Mruthyunjaya)
Message

Growth potential of dairy & food sector is enormous, and it is very much expected that the consumption of dairy & food products would grow at a very fast pace. Therefore, it is the need of the hour that the concept of ‘entrepreneurship’ vis-a-vis growth & development of dairy & food sector must be emphasized & encouraged. In this context, I am extremely happy that Dairy Technology Society of India and National Dairy Research Institute, Karnal are jointly organizing the National Workshop on Entrepreneurship Development in Dairy & Food Industry at National Dairy Research Institute, Karnal on December 23, 2005.

There cannot be two opinions on the vast potential of Dairy & Food Sector, in terms of its ability to generate & encourage entrepreneurship. Further, the entrepreneurship in this sector would automatically lead to a significant shift in employment as well as income generation not only directly, but also across the different steps involved in it, viz. supply-chain in production & procurement of raw materials, storage of the finished products, distribution of food / dairy products to consumers, etc. I am also sure that this Workshop will discuss the policy-interventions as well as "modus operandi" required to promote entrepreneurship development in dairy & food sector. I consider it a matter of great privilege to extend a hearty welcome to all the delegates in the Workshop.

I wish the National Workshop all the success.

(SUSHIL KUMAR)
MESSAGE

I am pleased to learn that Dairy Technology Society of India and National Dairy Research Institute, Karnal are jointly organising a National Workshop on 'Entrepreneurship Development in Dairy and Food Industry' on 23rd Dec. 2005.

This is a very timely Workshop, since a large number of technologies have been perfected by various R&D and Academic institutes, however, there are not many takers due to the lack of Entrepreneurship as well as confidence of R&D.

I am sure a large number of distinguished delegates would be attending this Workshop and taking part in panel discussions to come out with some concrete suggestions to guide the policy makers of the country. This will go a long way in the Development of Dairy and Food Industry.

I wish the participants of the Workshop, fruitful discussions and the organisers a great success.

(Dr. AS BAWA)
Director
December 1, 2005

Message

I am happy to know that the National Dairy Research Institute (NDRI), Karnal is Organising a National Workshop in association with the Dairy Technology Society of India, on December 23, 2005 at NDRI, Karnal! I am also happy to know that the organisers are publishing a souvenir on this occasion!

India has a tremendous growth potential in the agri-business sector. There is a paradigm shift in the agri-business, particularly in the dairy and food business. In the entrepreneurship development for the dairy and food sector, other than techno-economic feasibility, market-driven product price mixtures and effective supply chain as well as optimal productivity are the key factors. And, I do hope, the National Workshop would deliberate on these issues critically.

I wish the National Workshop a grand success!

(Animesh Banerjee)
An Entrepreneurial Approach can change the face of India

An entrepreneur has to command multifarious personality traits and skills to marshal varied resources and set up an enterprise. These traits can be inculcated by proper training interventions. Entrepreneurship Development Programmes have not just been advocating this but have also proved it right by turning entrepreneurs out of laypersons. It is heartening to note that today people view entrepreneurship beyond just the risks involved in taking it up. More and more people have awakened to the fact that entrepreneurship if pursued with knowledge, skills and the right approach can yield mega landmarks and breakthroughs. In other words, Entrepreneurship Development Programmes to create entrepreneurs have global acceptance today.

Sector-specific EDPs, where inputs are imparted in keeping with the opportunities and potential of a sector, are gaining wide acceptance as the incidences of success are high and the fear of failure does not lurk.

Food processing is one area which has potential galore but unharnessed. This appears true when viewed against the backdrop that a large percent of the GDP of most countries comes from agriculture and food & agro processing sector. All it needs is implementation of diverse approaches to reach successful solutions. At the macro level, the sector can be successful only if its potential is maximised by trained human resources taking advantage of the opportunities thrown open in the liberalised era. EDI, at the behest of the Ministry of Food Processing, Govt. of India, took the challenge and brought about successful emergence of professionally managed enterprises in the states of Gujarat, Maharashtra, Jharkhand, Uttarakhand, Uttar Pradesh, Orissa, in addition to the eight states of Northeast India.

Moreover, according to the organic market analysts, “Organic Monitor”, dairy is one of the fastest growing organic categories, with 2004 sales up on the previous year by 12.5%. Organic milk and yoghurt are said to be the segments reporting the highest levels of growth, with sales of organic dairy products set to remain buoyant throughout 2005. (Tom Armitage reports dt. 21.09.2005.) Amul began the Dairy Co-operative Movement in India which culminated into an epic co-operative organisation with resounding success. This is being replicated in 70000 villages in about 200 districts of India. What therefore can be derived is that there is a huge potential which if tapped can lead to enviable success. I appreciate the efforts to organise this ‘National Workshop on Entrepreneurship Development in Dairy and Food Industry’. India has diverse avenues but it requires multifaceted people to bring them to the forefront. And efforts like this are a step towards translating these dreams into reality. My heartiest congratulations! ! !

Dr. Dinesh Awasthi
Director, EDI
MESSAGE

The developments in Science and Technology have catapulted the sector of Dairying to a very vibrant and happening sector of the Indian economy. The results achieved after the white revolution have now set a launching pad for the Dairy industry to scale new heights.

The dairy industry has mainly been so far a saga of success of cooperative and public sector organizations with a small number of private initiatives. There is a need to infuse entrepreneurial spirit in the sector backed up with appropriate technology based interventions, products and processes.

This workshop being organized by the Dairy Technology Society of India, would help in increasing the inflow of entrepreneurs in the domain of dairy and food industry by drawing out an action plan. I am extremely happy to be associated with an event of this nature which aims to develop knowledge based and technology driven enterprises. My good wishes to the Dairy Technology Society of India for success of this event.

December 05, 2005
NEW DELHI

(H.K.MITTAL)
DAIRY TECHNOLOGY SOCIETY OF INDIA
National Seminar on Value Added Dairy Products
(December 21-22, 2005)
&
National Workshop on Entrepreneurship Development in Dairy and Food Industry
(December 23, 2005)
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December 01, 2005

Message
S. Singh
President
It is heartening that Dairy Technology Society of India in collaboration with National Dairy Research Institute is organizing one day National Workshop on “Entrepreneurship Development in Dairy and food industry” on December 23, 2005.

Dairy and Food Industry is of enormous importance for India’s development because of the vital linkage and synergies that it promotes between the two pillars of economy, namely industry and agriculture. India is bestowed with lot of agricultural produce. It has also to face tremendous problems of unemployment due to teeming population. Economic liberalization and rising consumer prosperity is opening up new opportunities for diversification in dairy and food processing sector. In this scenario, entrepreneurship development in dairy and food sector will be a key driver for promoting and sustaining the momentum of growth and providing employment.

I am confident that the deliberations will make a significant contribution towards development of entrepreneurship, thus helping in job generation and product diversification.

I extend my best wishes for the success of the National Workshop.

(S. Singh)
National Entrepreneurship Board of the Department of Science & Technology (Govt. of India) proposed the idea of organizing a one-day ‘National Workshop on Entrepreneurship Development in Dairy and Food Industry’. Dairy Technology Society of India took the lead in putting this idea into a concrete action plan, which resulted into the National Workshop being held today at NDRI Campus. This underlines the confidence of Govt. Departments like DST in the ability of the Society and gives us hope for future collaborative programmes.

Scope and status of entrepreneurship in dairy & food industry, role of technology business incubators, role of venture capital, marketing opportunities for SMEs, availability of process equipments etc. are the likely topics for discussion in the forthcoming National Workshop. It has been the endeavour of the Society to invite eminent speakers who are specialists in their fields. It is expected that delegates will have a very fruitful and rewarding experience and will be exposed to new ideas in entrepreneurship promotion strategies.

Financial support provided by the Department of Science & Technology (Govt. of India) is gratefully acknowledged. The pivotal contribution of Mr. H. K. Mittal, Advisor & Head, National Entrepreneurship Board, DST, New Delhi, in conceptualizing, planning and facilitating at every stage has been very encouraging and rewarding. I also express my gratitude to all the delegates for responding to our invitation in making the National seminar a grand success.

I thank Dr. Sushil Kumar, Director, NDRI, Karnal, who has been monitoring the progress of the National Workshop very closely and has very strongly encouraged such programmes. I express my gratitude to all my colleagues for their support, guidance, encouragement and good wishes.
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Dairy Technology Society of India

Wishes its Members and Delegates

Milk for Health & Wealth

A Very Happy New Year 2006
Invited Papers
National Workshop

Sponsors
National Workshop on Entrepreneurship Development in Dairy and Food Industry
(DECEMBER 23, 2005)

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From the President’s Desk

I take immense pleasure in welcoming, on my behalf and on behalf of the members of the organizing committee, all my fellow dairymen and other delegates to the 1st National Workshop on “Entrepreneurship Development in Dairy and Food Industry” being organized jointly by the newly constituted Dairy Technology Society of India and National Dairy Research Institute, Karnal. We are highly thankful to the Department of Science and Technology (Government of India) for sponsoring this programme.

The term “entrepreneur” is rooted in the French word, “Entreprendre” which means, “to undertake”. The term was first used as a technical economic term by the 18th century, French economist Richard Cantillan. He portrayed an “entrepreneur” as one discharging the function of direction and speculation. It was further stated that, “the entrepreneur was a person endowed with the qualities of judgment, perseverance and a knowledge of the world as well as of business.

Dairy and Food Industry is of enormous significance for India’s development because of the vital linkages and synergies that it promotes between the two pillars of the economy, namely, Industry and agriculture. India is world’s second largest producer of food and has a potential to become number one with sustained efforts. We are already the largest producer of milk. The growth potential of this sector is enormous and it is expected that the consumption of the value-added dairy and food products would grow at a very fast pace. This growth could bring immense benefits to the economy, raising agricultural yields, enhancing productivity, creating employment opportunities and raising the economic standard of a large number of populations. Economic liberalization and rising consumer prosperity is opening up new opportunities for diversification in dairy and food processing sector. Liberalization of world trade will open up new vistas for growth. In this scenario entrepreneurship development in dairy and food sector will be a key driver for promoting & sustaining the momentum of growth. Governments, Institutions and individuals have increasingly visualized entrepreneurship as a strategic intervention for accelerating the pace of development in any economy.

Entrepreneurship development is essential for exploiting full potential of dairy and food industry on one hand and providing job opportunities to the teeming population of the country on the other. The scope for wage employment is not only limited but decreasing very fast. Even the nature of wage employment is undergoing drastic transformation from the security-oriented job to performance based contractual assignment. Under such situation entrepreneurship development is a must.

There are certain requirements of a successful entrepreneur. An entrepreneur is one who takes initiative and establishes economic activities or enterprises. The two key actors for entrepreneurial development in developing societies involve breaking with the past and widening perceptions of economic opportunities. From a psychological perspective entrepreneurship is the creative and innovative response to the environment. Some of the
important entrepreneurial characteristics are: the need for achievement internal locus of control in which the individual is defined as being, “dependent on internal reinforcement, therefore, more self-reliant, desirous of independence and autonomy”. Furthermore, energy, initiative seeking, risk taking, responsibility seeking, positive self-concept, problem solving, resourcefulness, innovation, creativity, leadership, optimism and searching environment would be the ideal qualities for the best entrepreneur.

The focus of the National Workshop will be on market research, technology innovations (product and process development) technology management, venture capital funds, technology business incubators and capacity building. The National Workshop will also discuss the policy interventions required to promote entrepreneurship development in dairy and food sector.

I am confident that the deliberations will make significant contribution in developing and promoting entrepreneurship in dairy and food sector.

I once again extend you all a very warm welcome to this one day National Workshop on “Entrepreneurship Development in Dairy and Food Industry” and hope that your stay at NDRI would be comfortable, enjoyable and fruitful.

Dr. S. Singh
President
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Dairy Entrepreneurship

DR. S.P MISHRA
Vice Chancellor
Dev Sanskriti Vishwa Vidyalaya, Haridwar

It is quite significant that NDRI Karnal, a premier institute of the country has taken initiative to organise this National Workshop on Entrepreneurship Development in dairy & food industry. I am grateful to the organizers for having given me this opportunity to address this august audience. It is indeed a great pleasure to revive my days at NDRI as S-I scientists in the Department of Dairy Extension during 1978-82. The best part which I remember is the research project on dairy entrepreneurship conceptualized, completed and paper presented on profile of dairy entrepreneurs of Haryana. Let me begin with this background.

While technology development in general has drawn considerable attention, it is irony that adoption by masses has been ignored not because of the efficacy of the technology but owing to less visibility of its “business Face”. This seems to be true in the case of dairy technology also. The ‘business face’ connotes the potentiality of being entrepreneurial in its sphere. Therefore, it is important to provide a face-lift to dairying & dairy technology in making it popular, profitable and capable of creating human potential towards overall progress of the society. The scenario for this is quite appropriate & favourable.

The Scenario

- Dairy perceived as subsidiary occupation for vast majority of farming community has acquired independent status as main occupation.
- About 91 million tons of milk is produced in the county but per capita availability remains only 232 gm.
- Vice-Chancellor, Dev Sanskriti Vishwavidyalaya, Gayatrikunj-Shantikunj, Hardwar
- Milk productions has increased and the scope of dairy as an enterprise based on milk production, it’s processing and product conversion has found scientific and economic base.
- Value addition in processed milk and milk product has gained ground in international sphere.
- Emergence of diverse profile of Indian consumers showing definite liking for milk and milk product.
- Perceived as essential ingredient even for poorest masses.
- Varied demand at low cost but visible demand for quality based product at premium price thus showing pathways for production and consumption.
- There seems to be concerted attempts of research and development in the areas of milk production, processing, product conversion and value addition.
- Researchers have brought into focus the possibilities of setting various types of cow bases enterprises using cow dung, cow urine and its combination with different herbal formulations.

The Emerging Trends

The scope of wage employment is not only limited but decreasing very fast. Even the nature of wage employment is under going drastic transformation from a security-oriented
job to performance based contractual assignment. Such a situation has virtually compelled people in general to think more for entrepreneurship/ self employment. In this process, an analysis of the situation indicate clearly that today's environment is sensitive toward the aspects like:

- Highly competitive market
- Competition between public and private sector
- Quality consciousness and standardization of product
- Security/ guarantee
- Fast changing Technology
- Technological collaboration
- Liberalization in policy and action
- Health / Hygiene
- NRI's readiness to invest in India
- Privatization of Public sector.
- Increased export opportunities and mental readiness of other countries to buy products from India
- Emphasis on self- sustenance of supporting / promotional organization leading to better services from them.

The above scenario therefore, raises one of the most significant issue as how to take advantage of such situation? The simple answer seems to be integrating the situation with the concept of developing dairy entrepreneurs leading towards the development of technology & growth of the users of the technology thus benefiting the society as a whole. I feel like deliberating on the fundamental of issue of the concept & its applicability.

**Perspective on value added dairy products**

While emphasizing the international perspective of value added dairy products, commodity & Trade Division of FAO highlighted few significant issues. Accordingly it made certain observations that the perspective on value added dairy products may be viewed in terms of certain elements like:

- increased urbanizations & income growth in the developing countries
- growing power of super market
- concentration in the processing sector
- different level of adding values
- increased segmentation of consumption
- changes in eating habits

Of these, it is noteworthy to look at deeply the last element i.e. changes in eating habits. For example, pizza with soft drink is considered to be a preferred choice by youth segment but the question is why not pizza with milk product such as flavoured milk, chilled coffee, cold lassi etc.? Amul products have brought revolution by providing scope to use dairy products in break fast, launch, and dinner or in between. Developing innovative products for all age groups with varied profile suiting to all segments is possibly the call of the day. But all these could be operational though promotion and developments of dairy entrepreneurship.
UNDERLYING CONCEPT OF ENTREPRENEURSHIP

The growing awareness of the need, and urgency building "entrepreneurship" for attaining of accelerated and self-sustained economic growth could be ascribed to two factors. First, the belief is gaining ground that economic growth in the advanced countries is attributable to entrepreneurial awareness rather than to capital. In fact, several empirical studies recently conducted show that entrepreneurs or "human capital" has grown in the western countries at much faster rate than conventional capital and has made major contribution to economic growth. Second, investment in human resources has directly contributed to economic growth by promoting the knowledge of applying of science and technology in production process, new innovations, research, and training of workers in different technical skills needed for production. The building up of right type of attitude, and interest conductive to higher output is a pre-requisite. The fundamental problem in developing countries is, therefore, not the generation of wealth but the creation of ‘capacity to generate wealth’ and strengthening, enhancing and improving the absorptive capacity of the country.

A variety of concepts and theories propounded by the past researchers seems to indicate that the emergence of entrepreneurs in a society depends upon closely interlinked economic, social, religious, cultural and psychological variables.

Entrepreneurship Development

Entrepreneurship development is an approach of developing human resources. It is concerned with the growth and development of people towards high level of competency, creativity and fulfillment. This approach helps people to grow in self-control, responsibility and other abilities and then try to create a climate in which all clients may contribute to the limits of their improved abilities. It is assumed that expanded capabilities and opportunities for people will lead directly to improvement in operating effectiveness. Thus, entrepreneurship development as an approach does not confine itself in setting up enterprises but surpasses this limit in creating conducive climate for optimum utilization of limited and scattered resources and making people functional in all walks of life.

Entrepreneurship is the creative response to an environment that combines innovativeness, readiness to take risk, sensing opportunities, heightened initiative, perceiving and mobilizing potential resources, concern for standard of excellence, persistence in achieving the goal, positive orientation to problem solving and constant striving for growth and excellence. When all these attributes are developed in one person, the person can be found in any field of activity such as industry, business, education, public or professional bodies etc. But wherever they go they create a landmark, turn the direction of the tide and attain heights.

In the economic field entrepreneurship refers to identifying/innovating ideas, product and services, mobilizing resources, organizing production/services and finally marketing them covering the risk with constant strive for growth and excellence. There are enough empirical evidence to suggest that whenever the number of such person has grown in a society or country that that society/country has attained greater prosperity at that point of time. Every country, therefore, needs large number services of various types for attaining national prosperity.
The Process of Entrepreneurship Development

The experience has shown that two major factors have played significant role in developing entrepreneurship. One of them is the development of human factors – the entrepreneur himself, another major factor in the development of environment where entrepreneurial activities can flourish and grow. The human factor refers to the, values, attitude, desire and motivation of individual, his capability to perceive the environmental changes and opportunities as well as his ability to solve the problem which entrepreneur is likely to face. All these qualities differ on the average from country or culture-to-culture and these differences are related to rate of economic growth. These qualities known to be entrepreneurial qualities, are not inherited by a person rather acquired in the process of socialization in a particular culture. Emergence, growth and development of entrepreneurial qualities takes root in childhood and continue to get sharpened with conscious attempt.

Many attempts in promoting entrepreneurship in different countries have yielded variety of experiences. Some were highly successful other disappointing and perhaps the majority were cases that had the possibility of considerable success. Analyzing these past experiences mainly from the perspective of the client system the whole process of entrepreneurship development can be seen as a process having three distinct phases:

- **STIMULATORY**
- **SUPPORT**
- **SUSTAINING**

**Stimulatory Phase**

This initial phase would include all such activities that stimulate the specific target group. These activities may be in the form of generating entrepreneurial awareness, identifying potential entrepreneurs, developing enterprise launching & enterprise mangers to the local situation etc.

These stimulatory activities help in the emergence entrepreneurs in the society. This prepares the background from where people start looking for entrepreneurial pursuits. It generates the initial motivation, helps people perceive opportunities and incentives that awakes them besides acquiring relevant information and skills. All these taken together stimulate entrepreneurship in a society.

**Support Phase**

This group of activities provide nurturance & help to the already stimulated entrepreneurs to move ahead in achieving his immediate goal of setting up and running his enterprise. Such activities may include the arrangement of infrastructural facilities, technology, finance, market support, licensing etc. These activities remove many hurdles which are likely to cause sickness to the unit or which discourage the new entrepreneurs.

**Sustaining Phase**

Activities in this phase are those that help the entrepreneur in continued, efficient and profitable running of his enterprise. After the stimulation of entrepreneurship and subsequent adequate support the entrepreneur succeeds in starting his unit. Quite often, however, an
entirely new set of problems crop up before him once he commences production. He may not be fully prepared. For some of them it may be non-viable due to many unforeseen and uncontrollable factors. The small enterprises are susceptible to a variety of vagaries. Even well managed units may suffer closure for want of raw materials, lack of availability of substitute, change of skilled hands, etc. Such causalities which are comparatively higher in the small units require a lot of sustaining activities like: Helping in modernization/diversification/expansion/product substitution, additional financing for full capacity utilization, modification of changing legislation/policy affecting units etc.

Each phase of activities mentioned above is highly interactive, supplementary and crucial to the other phases. If there is a flow in the planning and execution of one phase, the other phase may be rendered anfractuous. Often it is found that the promotional agencies place excessive emphasis on support activities such as arranging finance, providing plant and machinery on long term basis, and establishing industrial estates to provide the infrastructure like land, shed, and power etc. However, in models where stimulatory phase is neglected and it begins with support activities, the outcome can be non-availability of entrepreneurs and lack of motivation to run their enterprises efficiently.

If outsiders are brought in, the lack of acquaintance with the locality may render the industry sick, which may further be aggravated if the programme does not have sustaining activities. Stimulatory activities are sometimes over emphasized at the cost of other activities which may result in an over abundance of budding entrepreneurs but there may be a lack of timely support from concerned agencies. This will not only demotivate entrepreneurs, this may also have a negative multiplier effect. The ultimate causality in this process is the credibility of the agencies concerned with entrepreneurship development. Similarly if provision is made for sustaining activities without arranging a matching degree of stimulatory or support activities, there may be not be sufficient number of units to be sustained. Thus balanced emphasis is required on all the three phases to set desired result on continued basis.

**Entrepreneurship Development through Planned Training Intervention**

Training in entrepreneurship provides an impetus to the potential and budding entrepreneurs to acquire a new identity about himself. This is perceived as an approach towards transforming people which serves the purpose of making people aware about their own identity, help them accept a new identity and finally establish such identity for entrepreneurial pursuit. In order to take up such task of transformation we can find entrepreneurship training serving the purpose of stimulation, orientation, preparation and implementation in a sequential order. In order to apply the model, one requires an understanding about approaches to entrepreneurship training programme.

**Recent approaches for entrepreneurship Training Programme**

With the increased emphasis of developing entrepreneurs, witnessed a phenomenon change has been witnessed in its approach to create entrepreneurial awareness an generate entrepreneurship in the society. What appears to be most significant is their realization that no approach can meet all requirements in dealing with diverse population scattered over widely dispersed area of any country. Consequently, different types of entrepreneurship development training programmes took a shape in making it as an effective preposition for industrial development. Recent approaches to entrepreneurship training may be seen as:
Enterprise Development Process

1. Entrepreneurial Education
2. Planned Publicity for Entrepreneurial Opportunities
3. Identification of potential entrepreneurs through scientific method
4. Motivational Training to new entrepreneurs
5. Help and guidance in selecting products and preparing project reports
6. Making available techno-economic information and project reports
7. Evolving locally suitable new products and processes
8. Availability of local agencies with trained personnel for entrepreneurial counseling and promotions
9. Creating entrepreneurial forum
10. Recognition of entrepreneurs

1. Registration of unit
2. Arranging Finance
3. Provoking land, shed, power, water etc.
4. Guidance for selecting and obtaining machinery
5. Supply of scarce raw material
6. Getting license/ import license
7. Providing common facilities
8. Granting tax relief or other subsidy
9. Offering management constancy
10. Help marketing products
11. Providing information

1. Help modernization
2. Help diversification/expansion/substitute production
3. Additional financing for full capacity utilisation
4. Deferring repayment/ interest
5. Diagnostic industrial extension / consultancy/ sources
6. Production units legislation/ policy charge
7. Product reservation/creating new avenues for marketing
8. Quality testing and improving services
9. Need based common facilities center
• Target oriented
• Location specific
• Product and process oriented

Target Oriented

Such EDPs are directed and planned for a specific group that has distinguishing features as compared to other groups. It is because of the fact that target audience varies in terms of their background, experiences, training and exposure to business world. Moreover, the size of the proposed enterprise may also vary from one target group to others. These variations demand for the matching training inputs with varying degree of intensity to bring these entrepreneurs to the threshold from where they can launch their enterprise and be able to manage them successfully. For example, a group of MBA entrepreneurs may require less intensity on management skill development input as compared to other aspects. Similarly, for a group of entrepreneurs who want to set up considerably larger units may require high intensity on management skills rather than those who are going to set up comparatively smaller units. For this purpose, various target groups may be identified like (i) General entrepreneurs (ii) Science & Technology Entrepreneurs (iii) Women entrepreneurs (iv) Educated Unemployed Entrepreneurs etc.

Location Specific

In order to reduce regional imbalance and the imbalance that may exist between progressive and non-progressive areas, it is of considerable importance to plan EDPs depending on the characteristics of the area itself. Location in terms of urbanization, concentration of specific target group in a particular area etc. may be considered under such specific EDPs.

Product and Process Oriented EDPs

The late eighties is experiencing a shift from Target Oriented EDP. Such EDPs are organized for a group of prospective entrepreneurs who opt for enterprises having set product line or process such as dairy technology, plastic or electronics or construction materials or food technology etc. It seems to have a great future, but some of the efforts made recently were found suffering from the lack of appreciation of the role played by inputs, other than product and process orientation. In the absence of such comprehensive programme, the acquired knowledge and skills about product and process will not automatically result in development of entrepreneurial quality, competence for enterprise launching and ability to manage which are crucial to start and ensure success.

All these approaches need to be viewed interims of certain activities which also in a way, indicates as how such programmes could be conducted. These activities are as follows:

a) Documentation of Entrepreneurial opportunities in the area

Before launching the entrepreneurship development training it is considered necessary to document the industrial opportunities in the area. It is expected that in selected districts some techno economic survey indicating availability of raw material, human, infrastructural facilities, potential demand of goods etc. have already been conducted. Similarly, Bank report may also be considered to substantiate the potentiality of developing a particular area. The training institutions, therefore, need to collaborate with local bank and other promotional organizations to prepare project profile based on such documents.
documents may be made available to the participants during the program with an objective to help them identify a suitable project for themselves.

**Information about the possible supply of entrepreneurs**

Availability of resources and demand of products in a particular area is one aspect of development but equally important aspect of the availability of potential people capable of transforming the resource into production possibilities. Therefore, it is important to ascertain the availability of potential entrepreneurs in the area. For this, a detailed information regarding availability of potential people may be obtained through technical institutions, universities, financial institutions etc. This may even help us deciding the target group for the programme.

**Motivational campaign for attracting & identifying potential entrepreneurs**

Based on several experiences it is considered necessary to organize a well-planned and effective campaign in the area in order to create awareness about the entrepreneurial opportunities and the role and support of various agencies. The motivational company will include preparation of some pamphlets to be distributed through various channels, educational institution and other promotional organizations. Announcement in the local newspaper, circular to various offices etc. may be taken up seriously for giving wide coverage to the programme and attract potential people for the programme. Response to such organized campaign itself is an indication of interest a person might be having towards entrepreneurship. Such identified people, in fact, form the base of selection of a limited number of participants for the training programmes.

**Selection of potential entrepreneurs**

The task of the training institution becomes very crucial for this aspect, it has been established through researches and experience that the proper selection of participants for the training programme yields better result. But the scientific selection is possible and meaningful only when good response is obtained through motivational campaign. Whenever emphasis is only on selection without motivational campaign, the result is seen it terms of limited candidates taking on selection test and therefore, minimizing the scope and choice of selection.

Fortunately a battery of selection tests is available whose reliability and validity is beyond any doubt. The training institution, therefore, needs to be aware about such test and use it with sincerity of purpose to finally select a group of candidates suitable for such programme.

**Identifying Training needs to the Target group**

The candidates could be selected either as preconceived target group like science and technology group, women, educated unemployed, etc or it could be mixed group entirely left on selection criterion. In both the cases, it is desirable to assess the training needs of the candidates based on their backgrounds, experiences, aptitude and entry behavior in terms of their awareness, understanding, competencies and skill in diverse areas. This provides a base to formulate a training strategy for the identified group. The assumption is that all the target groups are not the same and the training treatment requires different approach to help achieve the basic objective of ‘Transformation’.
Training

The training institution is expected to take the full responsibilities of planning, designing and conducting the training programme. The detailed activities, and process of designing in a broader perspective. However, some of the activities related to this phase may be enlisted here for illustration only. Such activities can be divided into two parts: (a) Academic & (b) Non-academic. The academic activities comprise of: (a) designing the training programme, specifying content coverage is sequence, mode of content coverage, faculty requirement and availability (b) arrangement of training aids (c) preparation of information material for the participants (d) arrangements for market survey (e) in-plant attachment (f) interface with promotional agencies (g) interface with existing entrepreneurs etc. In case of non-academic activities the institute is required to pay attention towards, making arrangements for (a) training venue and class room facilities (b) Board and lodge (c) Inaugural and valedictory normally for long duration ranging from 4 to 12 weeks on full time basis. Therefore, the involvement and commitment of training institution plays a significant role for the success of the programme. At any point of time, even little slacken and unconcern shown by the training institution makes the programme a rote learning instead of facilitating learning process. Any kind of commercial approach by the institution-conducting programme can only fulfill the target of training but remains devoid of developing entrepreneurship through training intervention. It is, therefore, important for the training organization to understand the delicacies of undertaking entrepreneurship training programme.

Post-Training Support / Follow-up

Post training support by the institutions organization entrepreneurship training programme is as important as providing a well-knit package of inputs to help the individual in his transition from an individual to an entrepreneur. Often the potential entrepreneur, after undergoing training, is still rifflled with myriads problems, both personal & institutional. While he has chosen a product line and prepares a project report, he still needs some one to whom he can go for clarifications and help in many steps, before he can successfully ground the project. This much needed support and counseling, after training, has to be given by the faculty concerned for him to sustain his enthusiasm and efforts to become an entrepreneur. Monthly review with the trained entrepreneurs and keeping contact with them by the coordinating faculty has proved beneficial to them. It has been felt that the counseling and support makes their movement much faster in reaching their goal.

Salient Findings

It seems important to take advantages of the earlier experiences & research findings, which may be summarized as follows:

• Promotion and development of entrepreneurship is more developmental in nature and is not administrative or target-oriented.
• Entrepreneurship development is not a programme but a process whereby people in general are stimulated, supported and their enterprising activities are sustained.
• Accumulated experience has brought maturity in approaches and strategy of developing entrepreneurship.
• Experience suggests that entrepreneurs could be developed through a well planned integrated approach.
• A set of competencies is already identified to help people become entrepreneurs. These competencies could be developed through training intervention.
• Competencies could be broadly grouped as:
• Behaviroal
• Enterprise launching and resourcing
• Enterprise management
• New economic opportunities are identified and available which may be integrated in entrepreneurship development programs.
• Special attention may be made to promote “marketing entrepreneur” and R & D entrepreneur.
• Emergence of women entrepreneur through women empowerment seems to be an established fact.
• Micro enterprise creation and development though micro-finance has shown a very significant result.

These findings could be used to promote dairy entrepreneurship professionally.

**Suggestions**

Keeping in view the restricted environment in the area of wages employment and potentiality of developing dairy as an enterprise, it is perhaps important to look at the following aspects for consideration:

• Entrepreneurship curriculum may be devised especially in the context of dairy education and be introduced as part of the total curriculum.
• The institute may initiate establishing Entrepreneurship Development Cell for providing modular training to the students and dairy farmers.
• Technology Incubator especially focused on dairy technology and R & D for value added dairy products may be established for promoting dairy based enterprises.
• Attempt may be made to organize training on market entrepreneurs and promote such entrepreneurs.

It is expected that a modest beginning will be made through deliberating and discussing about the conceptual aspects of entrepreneurship development and its possible integration for promoting dairy enterprises in the country.
Technical Entrepreneurship Development in India: Some Reflections

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India's vast technical and scientific manpower has often been referred to. That personnel with Indian ethnic origin and basic degrees from India serve in scientific positions of influence in many countries of the world, and in various world bodies is a tribute to the quality of the Indian mind.

It is ironical therefore that unemployment in India stalks in such large measure. Successive governments of the country, have recognized the limitations of state generated avenues of earning and emphasized enterprise and entrepreneurship generated efforts. Support of entrepreneurship and the entrepreneur has accordingly become a significant dimension of industry academia relationship and several technical institutions in India have supported activity related to it. Concerns of engineering design and Product Development centers are but logical spin offs of this support to technical entrepreneurship.

The talk of industry-academia interaction itself is of a certain antiquity in the Indian world of learning. It has taken many shapes. It has talked of people from industry coming to the academia as adjunct faculty and the people from academia going to industry on sabbatical. Even prior to that, industrial training has been considered an essential part of the requirement for a technical degree. Indeed there are technical institutions which have talked of the concept of work station for their students.

The continuing education programme run by the academia for the serving personnel in the industry, is yet another dimension of this academia industry interaction. There are also provisions of project work in course of studies for a degree which are to be based by definition, in the industry. This is a part of degree education of a technical graduate. It is not surprising, therefore that a very large numbers of technical graduates in India have adopted entrepreneurship as a way of life.

From the early 80's this talk of inter-action between the academia and the industry took the form of crescendo. Perhaps one of the reasons why the talk of an academia-industry interaction took on so many different hues and shapes, and yet continued to be discussed and debated over and over again, was because the whole subject itself needed to be studied in a scholastic mode and the path of growth charted out, with precision. This was not adequately done. Very soon it was realized that interaction between the academia and the industry could not be limited merely to exchange of personnel but there was a need for a more substantive level of interaction between them.

It would need to be clarified as to what could be given by whom to whom. In other words, one needed to be clear on what the academia could give to industry and what the industry could give to the academia. One such potent exchange would have to be at the level of transference of ideas and experiences. No institution in then academia could be worthy of its role function if it was not generating ideas. Similarly all industry had some experience to share. The academia had to fulfill the trigger function. Unfortunately, however, this realization has been slow to emerge.

Writing through the mid 70's, I had noted “Few would dispute the evaluation that the pace of industrial development in our country leaves much to be desired. Indeed the consequent expansion of wage employment has not materialized as anticipated. It seems to be that in the field of technology a great deal of attention has been paid so far to inventions,
but the same degree of attention has not been given to research in managing, innovation. Innovation could mean setting into operation, the complicated and complex process of innovation. Such an approach would encourage the specialist further to devise the methods of bringing new technology into the productive sector of economy and evaluating their socio-economic soundness. As can be imagined, the feed back can influence the nature of the invention itself.” [Gautam, Vinayshil: Enterprise and Society, Concept Publications, Delhi, 1978]

Unfortunately, this was grudgingly and, at times, haltingly recognized. The case history of S T E Ps would be a case in point.

The process of innovation in Industry involves complex interactions between research and development, manufacturing, strategic planning and management. Industry can look to academia for talented people, fundamental knowledge and exploratory research and a perceptive assessment of emerging technological possibilities. Industry is the ultimate delivery mechanism. Thus a nexus between industry and academia is necessary for the success of the innovation process.

But unfortunately, there have been a lot of misconceptions regarding each other between both academia and industry. As a result there has not been sufficient co-ordination between them with regard to the technological advancement, commercialization of indigenous technology, etc. This has hampered the overall economic growth of the country.

The priority of Indian Industry, with regard to adoption of new technology has very often been collaboration with foreign companies, thereby discouraging the indigenous academic and research institutions in their pursuit to develop matching advanced technologies. The lack of communication between industry and academic has been often of an extent that industry did not frequently enough see academia as an entity to be approached for solving the problems it faced.

However, to look to external sources only for function, is a palpably unhappy situation for any industry. Indigenisation is not only a desiderata but an inherent necessity. Of the many attempts to bridge the gap between the industry and the academia (representing the R & D process) was the setting up of the Nayaduma Committee to explore the possibilities of a Science and Technology Entrepreneurs Park. The outcome was setting up of the NSTEDB. Unfortunately given the administrative allocation of responsibilities among various ministries and the central governmental level its ambit, till a very long time, did not overlap Agriculture. Till this day Ministry of Agriculture has to find its focus on self employment and indeed fashion an ‘all weather’ delivery mechanism.

The National Science and Technology Entrepreneurship Development Board (NSTEDB) hypothesized that Entrepreneurship Development Cells (EDC) could be set up in technical institutions and they would grow in Science and Technology Entrepreneurship’s Parks (STEPS). For this the academic environment was fit context. A look at the academic scene throws upon interesting and variegated picture. No such conceptualization and plan to implement was developed in the agricultural sector. NDRI has the potential to serve as a fit institution for such efforts. The present cusp with DST augurs well.

There are in Indian three clear components of science and technology based entrepreneurship efforts in educational institutions of post school learning.

(a) Research and Development
(b) Curriculum Planning, Faculty Development, Instructional Implementation
(c) Extension, Consultancy and Monitoring

Going by a qualitative assessment of the emphasis of efforts currently being put in, in the three areas in technical institutions the rank order of interest seems to be (1) extension,
consultancy and monitoring work (2) curriculum planning, faculty development and then (3) research and development.

The concerns of technical entrepreneurship are themselves more comprehensible and clearly focused if put in the analytical approach of system analysis. [Gautam, Vinayshil : Technical Entrepreneurship, Global Business Press, New Delhi]

It is clear that there is an interactory relationship among resources, facilities and environment covering the full gamut of finance, information, technology, material, organization and managerial skills. Entrepreneurship development can be said to move on the triad of the entrepreneur, enterprise and the environment. It needs to be recognized that while searching for an iconic model one has to keep in mind the requirement to develop it in a dynamic perspective. The attempt to develop a state-of-art report on Science and Technology Parks in India brings this out quite clearly.

The Indian situation is quite unique and experience has shown that private sector research institutions have at times tended to preemptively withdraw their support to initiatives such as STEP and public research institutions have found it difficult to overcome their procedural hassles. The result was that several registered STEPs floundered and yet many Technology Parks; outside the ambience of Research and Educational institutions came up.

There is a need for greater clarity, elsewhere too to distill the learning. The input for science and technology based entrepreneurship in engineering institutions (which ranged from entrepreneurship development cells, extension activities to STEPS, etc.) came from diverse and not un-often, un-correlated sources. They came from the office of the Commissioner for Small Scale Industry, National Science and Technology Entrepreneurship Development Board, Developmental Financial Institutions, Commercial Banks, Ministry of Human Resources Development and times even Public Sector Undertakings. This is not to refer to the State Government level intervention. It is not surprising, therefore, that there is a felt need for coordinating these activities. Be that as it may, the absence of such inputs for self employment efforts in the agricultural domain remains a gap which can only ‘cry’ for immediate even if belated steps.

The Research and Development activity scene with reference to small and medium sector industrial undertakings continues to be somewhat elusive. There is a clear need for reinforcing research activities in this sector with greater vigour to generate policy options for decision makers at all levels. An opportunity awaits, in which NDRI would well take the lead.

There is a clear need, also, to set priorities of research in the area of Entrepreneurship Development and Self Employment. This is not so much as to inhibit some type of research, but more so to enable the sponsoring agency to clear certain activities expeditiously. Unless this is done, mere movement in the name of activity would not help. It is reassuring to note some good procedures exist.

The issue, therefore, is really of aiding and encouraging the growth of medium and small sector enterprises, which would be the research route of the twenty first century.

So far as the teaching of entrepreneurship in Technical institutions in India is concerned the base is wide and is very often supported by the Education Development of the Ministry of Human Resources Development under the thrust area activity. A similar focus in Agricultural sector in general and animal husbandry / fisheries sector in particular has yet to emerge.

In all the sectors however, institutional support for activities related to technology assessment or of Engineering Design remains a need. Activity on product design, engineering design and instrumentation development needs to receive support at all levels of project work in science, technology and agriculture / rural development related institutions. Competencies in analyzing for generating choices, issue of technology transfer to small and
medium sector undertakings are critical. Ways have to be devised to do so as a part of the academic activity of a technical institution.

Product and Engineering design support both for consumer items and tools production is necessary for increasing productivity, increasing efficiency and quality. Giving practical shape to new ideas and integrating theoretical concepts with field generation is necessary for practical orientation. Perhaps all this could be integrated together to put together a suitable combination of technological arts with technological sciences focusing on consumer product development. The coverage of the courses in such areas also needs developing a convergence of the requirements of the industry with the level of skill formation in the academia.

Given proper skill formation base in technical educational institutions in engineering design coupled with product development centers a proper mechanism can be developed for technology transfer to small and medium sector. This requires a knowledge of the parameters of technology assessment as related to this sector, not to mention the need for clear thinking on what technologies can be transferred and which of them cannot be. Similarly, a clear cut perception of the impediments in the technology transfer process will have to be developed and coping strategies analyzed. It is unfortunate but true that so far the focus of the entrepreneurial development venture has been the small sector rather than medium sector. This needs rectification.

What would follow would be alternate livelihood earning avenues not just for the first generation, young entrepreneurs but also for the more mature persons who wish to switch careers after certain richness of experiences.

It is generally agreed that, to put together a substantive interaction of ideas, process and action between the industry and engineering institutions one needs an incubation center. This helps the business of commercialization worthy ideas. This incubation center can be in the form of a STEP, a Science Park or simply a Product Development Centre. The initiative in setting up such a center can be taken by an academic institution or by an industry.

Looking at some experiences in the engineering sector may help in devising lessons for value added dairy products development.

The first successful science part to be set up in India was at Birla Institute of Technology Mesra (Ranchi) 1972. In 1985 it was rechristened as Science and Technology Entrepreneurs Park. It has as its objectives the following functions: Establish close link with the faculty members of the engineering institutions to spot the entrepreneurial talents of students at the undergraduate level’ provide place and facilities for preparation of bench scale models, industrial prototypes with potential for commercial exploitation; involve entrepreneurs in planning and establishment of the industry; Render facilities to design, develop and fabricate toolings, for production. Evaluate the ‘Technology obtained’ by Hiring or collaboration and ensure proper mode of technology transfer provide opportunities for core group of STEP and R&D groups of the engineering colleges to develop know-how for commercial exploitation by new entrepreneurs; help small scale industries in diversification; establish close link with Industry, Research and Development Organization and Institutions of higher learning for the benefit of entrepreneurs; provide necessary Central Facilities for Testing, Development, Quality Control and Research facilities for entrepreneurs; identify products for indigenization; arrange for procurement and dissemination of information; organize seminars, workshop and EDP courses for the entrepreneurs; analyzed problems of entrepreneurs and suggests remedial measures.

STEP at REC, Tiruchirapalli has made progress during the last few years. It has got its own buildings, infrastructural facilities, industrial sheds etc.

Similarly, STEP at Jaya Chama Rajendra Engineering College, Mysore, has made progress. It has got a scheme for training final year students in order to prepare them for setting up
enterprises. At the end of the training in the college, the students are trained for a period of two years in an industry of their choice. This STEP has got a tie up arrangement with various organizations like Indian Telephone Industries Ltd., Bharat Earth Movers Ltd., etc. for promoting their ancillaries through the entrepreneurs trained by the college. There are about a dozen STEPS, besides these, in various stages of their establishment process.

Apart from STEPS, the National Small Industries Corporation (NSIC) has established various Proto-Type Development and Training centers (PDTCs), they are situated at Delhi (for dealing with machine tools, CNC, Lathes), Rajkot (Machine tools), Hyderabad (Electronics) Madras (Leather Industry). The PDTCs undertake research and development work related to the aforesaid industries in the respective centers. They also conduct training programme for developing skilled personnel suitable for the respective industries; apart from that they develop and advance the available process technologies and machineries. They have made some attempts to team up with technical institutions but no break through have yet come.

A review of the current situation of “Science Park Movement” in India shows the following strengths and constraints.

The strengths have been seen as
(1) Excellent workshop facilities
(2) Disciplined work force
(3) Wealth of experienced and trained manpower
(4) Common Service facilities
(5) Development of prototypes
(6) Training
(7) Level of autonomy
(8) Dedicated and committed senior officers and supervisors
(9) Good industrial relations
(10) Scope for creating a strong technological base for the indigenization, for example, leather and footwear machinery
(11) Support from the state government
(12) Industrialized vicinity
(13) Qualified faculty and expertise
(14) Simultaneous involvement of an academic institution and an industry
(15) Financial institutions in the same city as that of STRP

The constraints of the Science Park have been seen as:
(1) Inadequate funds
(2) Subsidized services
(3) Difficulty of balancing between commercial and promotional operations
(4) Power shortage
(5) Import of up-to-date technology
(6) Internal Team work
(7) Manpower
(8) Equipment
(9) Space
(10) Procedural hassles on transfer of land, funds etc.
(11) Poor state resources
(12) Lack of suitable Research and Development culture
(13) Lack of support from local industry
(14) Promotional aspect of government being taken too seriously
(15) No clarity on the part of sponsoring institutions in terms of the ultimate objective of the part
(16) Slow acceptability of “Park” concept by state level institutions

It is interesting to note that several STEPs are really surviving on running Entrepreneurship related training activities and providing services of one kind or the other. They have reportedly, been working in the area of design and development of machinery tools, training of skilled craftsman in conventional trades, computer applications and computer applications and computer numerical control (CNC), providing service facilities in the field of machine shop foundry, material testing etc.

A roundup of the experiences of the last few years showed that emphasizing development of entrepreneurs could not be done in isolation of the development of an enterprise and without references to the environment.

Efforts at entrepreneurship development in dairy and food industry would do well to keep this in mind.

The environment requires an understanding of the processes of technology development. Without the understanding technological change and technology transfer cannot be engineered. For achieving this the product development centers provides an important enabling tool. They enhance technological capability in a potent way and above all serves triggers of technological change. But this they cannot do all on their own and in isolation they need to couple up with the industry.

For this all to happen an understanding of the role of the technological change in Indian industry and the factors that necessitate technological change become necessary. The nature of technological change that can take place in product technology, can itself be industry and plant specific and that too in conjunction with logic of the management systems. The product development centers would require generic abilities of management analysis coupling it indistinguishably with product development research.

Any issue is as complex or as simple as the mindset of approaching it, makes it out to be. The problems as soluble, the growth paths are clear. A clear vision, determined will, organised pooling in resources and capabilities to make it move, are required. The last element (capability) is there in abundant measure in India, the third (organised pooling in of resources) can be factored. The first (clear vision) needs an orientation but the second, “a determined will’ cannot be ordered a-la-carte. And yet hope is a `no choice situation`!
Marketing of Milk and Milk Products Opportunities for Entrepreneurship

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**Introduction**

India has emerged as the largest milk producer in the world accounting for 90 million tones valued at around Rs 90,000 crores. It is estimated that the milk production would be around 94 MT by 2006. India is not only the largest milk producer but is also one of the most economical milk producers in the world. However, in the world trade of dairy products India accounts for hardly 1% of the share compared to the share of New Zealand at 24% of the worlds trade in dairy products.

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<td>India</td>
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The urban market for milk products is expected to grow at an annual growth of around 33% which is around Rs 43,000 crore by the year 2006 in value terms. Presently, the Indian dairy produce is expected to be Rs 70,000 crore which is expected to be Rs 1,00,000 crore.

**Present Dairy Status**

India with 134 m cows and 125 m buffaloes claims to have the largest population of cattle in the world. More than fifty percent of the buffaloes and twenty percent of the cattle in the world are found in India and most of these are milch animals.

Presently, 22 State Cooperative Federations in the country with the network of 70,000 village Dairy Cooperative Societies federated into 170 Milk Producer Unions.

**The Indian Market a Barometer**

Milk has been an integral part of Indian food for centuries. This is below the world average of 285 gm.

During the year 1950 the per capita availability was 132 gms/day, which has risen to 225 gms/day during 2001 and to 250 gms/day by 2005. (Provisional). This is below the world average of 285 gm. There are regional disparities in production and consumption as well. The per capita availability in the northern states is 278 gm, western states 174 gm, southern states 148 gm and in the east only 93 gm per capita per diem.

**Fresh Milk**

It may be recalled here that over 50% of the milk produced in India is buffalo and 45% is cow milk. A large part of milk consumed in India is not pasteurized, and is sold in loose form by vendors. Sterilized milk is yet to get popularity in India.
In India, about 46% of the total milk produced is consumed in liquid form and the remaining 54% is utilized for conversion to milk products. Of these, ghee alone accounts for 85%. About 7% of the milk goes into the production of western dairy products like milk powders, processed butter and cheese.

For cooperatives, of the total milk procured, 60% is sold in fluid form and the rest is used for value added dairy products. For Private Dairies, only 45% is marketed in fluid form and the rest is processed into value added dairy products like ghee, butter etc.

Presently, only 15% of the milk market is represented by packaged and branded pasteurized milk valued at Rs 9,000 crores. Quality of milk sold by unorganized sector and loose milk vendor is inconsistent, which makes the milk unhygienic.

Millions of liters of milk is consumed as whitener for tea and coffee which is a sizeable volume per day. Presently only 800 out of 3,700 cities and towns are served by milk distribution network. According to one estimate, the packaged milk segment would double in the next five years giving both strength and volume to the dairy sector.

India’s dairy market is multi layered. Hence, it is shaped like a Barometer.

**Potential for Future Growth**

For Milk Marketing, one has to do the three A’s of marketing availability, acceptability and affordability. Indian dairying is already endowed with the first two. As marketers, we have to enlighten and educate people in India to drink milk. If we can do this, no effort is required to make it acceptable. The other factor is that for large number of poor people in the country milk price is deemed high specially in the Northern Region making it almost non-affordable.

Alternative type of packing such as vending through machines in small quantity, adding zing to make children to drink milk, conveying health aspect of milk for lactating mothers and children specially women of more than 40 years of age and old people. It is also necessary to sell small quantities of milk powder in mini sachets, which is adequate for two or three cups of tea or coffee and other milk products for one time use and serve purpose. Example could be 50/100gms curds.

**Marketing Strategy for Future**

Due to the change in life style and rise in income among the consumers, the trends in marketing would shift from generic products to the packaged, quasi, regular and premium brands. The key elements for future marketing would focus on Strong brands and product mix expansion. UHT Milk, Ice Creams, spreads, drinking yoghurts, various type of lassi and set curds mixing with various flavour are the products, which would play a great role in the industry. Ready to Drink (RTD), Ready to Eat (RTE) and Ready to Serve (RTS) milk products would be the need of the hour for the consumers.

**Emerging Dairy Markets**

- Food Service Institutional Market - It is estimated that this is growing at the double digit rate of consumer market.
- Defence Market - Quality products for RTE and RTD at reasonable prices.
- Ingredient market – Dairy product to be used as raw material in pharmaceutical and allied industries.
- Parlour Market - RTE, RTD and RTS products which should piggyback on the fast food revolution.
Penetration of Milk Products

Western dairy products are not that popular in the country. All India penetration of butter is only 4% which is 9% in urban India and 2.1% of rural India. However, Metro share is around 15%.

Penetration of Cheese is almost zero in rural areas and negligible in urban areas. Per capita consumption in India is around 2.4 Kg/annum as compared to 20 kg/annum in USA.

Penetration of Ghee is higher in northern India, which accounts for 57%, in west it is 23% and in East and South together account for balance of 20%. In India, a large part of Ghee is still home made. The relative share of branded products in this category is as low as 1-2%.

Market Size and Growth

The market is growing at 4% per annum and 6.7% in the case of cooperative packed milk.

Major Players

The major players in the milk market is Mother dairy, Delhi followed by Amul, Nandini, Aavin, Vijaya and other cooperative brands. There are 17 cooperative brands in the packed milk segment.

Indian Milk Products (Traditional)

It is difficult to estimate market for indigenous food products as most of these products are manufactured at homes or in small cottage industries catering to local need and areas.

Consumers while purchasing traditional products look for freshness, taste and texture, variety and convenient packing. It is here that companies like Haldiram, MTR, KC Das and Sri Krishna have made in roads. Consumer loyalty is built by consistent quality, taste and freshness. This market is still at the hands of large sweet makers, halwais and sweetmeat shops.

However, Curds in the southern region especially in Karnataka has come out from the clutches of un-organized sector and taken over by cooperatives. Most of the houses have stopped setting curds at house.

Branding of Traditional Dairy Products

Ghee is the only product which is currently marketed by many brands such as MilkMan (Britannia), Mother Dairy-Delhi, Amul, Nandini, Aavin, Aarey, Vijaya, Verka besides Everyday (Nestle) and Farm Fresh (Wockhardt – a recent entry).

It is worth to note that Mafco sells large quantity of Lassi and Energee flavoured milk in Mumbai. Though Britannia has launched flavoured milk in various flavours in tetra packs, it is yet to see the success.

GCMMF has made a beginning in branding of other traditional products with the launch of Paneer, Flavoured milk, Mithai, gulab jamoon in major markets. Thus it has crossed a regional barrier from Gujarat to other parts of the country.

The demand for traditional products far exceeds that of western type of dairy products. The increasing requirements for these products present a great opportunity for organized dairies to modernize production. Most of these products are perishable, hence provision of cold chain is necessary to preserve the traditional products for enhanced shelf-life. Maintenance of uniform quality throughout will promote marketing efforts.
To sum up, milk sweets with well defined quality characteristics and packaged in attractive containers can be marketed at parlours, milk booths, restaurants, hostels canteens, airport, railways etc.

At least, 146 traditional milk based products are recorded to be produced in the country. In terms of annual value, the production of traditional milk products exceeds Rs 20,000 crore excluding the value of Ghee. In spite of this huge market potential, there is still no national known brand in the market.

As the market milk operation is getting more competitive, many of the dairy plants are looking for newer products and in this direction the traditional dairy products are drawing the attention of manufacturers for diversion of milk and also for value addition.

**Value Addition**

The milk solids form about 35-60% of the end product while it is more than 70% in many other dairy products being produced by the organized industry. Hence, there is immense potential for the introduction of these products on commercial scale. Upgradation of the processing technology for the manufacture of traditional products is perhaps the solution for many of the problems.

The key health trends in recent times are low fat, fortified, low sugar and where as Key Motivation factors are Convenience, quality, packaging, Fun/ Entertainment etc. These factors should be given needed importance while developing products or processes for market. Apart from these, the other factors, which are likely to determine the purchasing trends are product type, packaging, cost factor and convenience.

Apart from developing appropriate technologies, it is necessary to improve shelf-life along with quality of the product. In this direction, retort packing is likely to play a major role in the coming days apart from the hot filling rigid containers. These processes are likely to result in a shelf-life of the product for a commercially viable end product.

**Conclusion**

The organized Dairy Industry has to diversify into the manufacture of a variety of indigenous dairy products in the coming years. There are also likely prospects of export for these products. In order to achieve results in this direction, the industry has to gear up with appropriate technology, quality systems at the earliest.
Technology Development Process

MR. N.K. SHARMA
Former Managing Director, NRDC, New Delhi

Idea Generation and Selection of R&D Project

- Basic Discoveries lead to new products
  - Laser development & development of Infra Red Technology has led to at least 100 new products
  - Teflon has led to 4 new applications- heat resistant cables, non-stick pans, Teflon coated leather products, Teflon gaskets, Teflon based insulating materials, Teflon coated hockey stick, cricket bats etc.
  - Plasma Technology has led to development of Plasma TV, Plasma furnaces for various coatings, Plasma welding torches

- Accidental Discoveries lead to new products
  - Microwave Oven & popcorn
  - Rocket Motor
  - A liquid solidifies when a magnetic field is applied

- Incremental Innovations
  - Key Word Concept: reduce, improve, integrate, slow, increase, coarser, finer, quicker, longer life, additional applications, additional functions, waste reduction, cleaner etc. – applied to end products, components, raw materials, manufacturing process, by-products, environmental impact etc.
  - For every problem there is an opportunity for a new idea
  - A liquid solidifies when a magnetic field is applied

- Examples of Incremental Innovations
  - Electric Iron Press: Development process from Wire Heating Coil to solid burnout proof semi conductor ceramic heater, thermostat for automatic on/off operation, steam press, foldable insulated plastic handle, integrated concept to reduce accidental fire etc.
  - Luggage Hand Trolley: Trolley cum sitting stool
  - Mixer cum Grinder cum Juicer
  - CFC lamps

- Individual Inventions
  - Wellcrow
  - Zip Tie
  - NRI Girl in USA invents a clock that walks away after the alarm ring
  - Pop Spanner

- One Patent leads to another (IPR Searches)
  “You have to listen to music to create new music”
• Combinational Invention
  • Tyre Puncture Indication Device
  • Toilet with double flush system to conserve water
  • Glucose/Blood drop flow rate detection system
  • Carbon Fibre hockey sticks / Cricket bats etc.
  • Blood Bags with Online HIV Detection Arrangement

Selection of R&D Projects
• Identify risk factors in development (Assess, eliminate, reduce)
• Assess in-house Technical feasibility (capability in-house)
• Market Risk Factors
• Budget Risk factors
• Time Constraints
• Skilled / Technical manpower Constraints
• Assess R&D infrastructure requirements for the project
• Environmental risks
• Govt. Policy, Rules & Regulations impediments
• Cost of production estimates vs market competition
• Technical Barriers to Trade (TBTs)
• IPR infringement Risks
• Risks in Transportation, storage, use of the raw materials, by-products, end products etc to the operators and the infrastructure
• Stability Risks
• Statutory Certification Risks
• Competitor may take a lead
Technology Development Process

Technology Development Plans

• STUDY OF EXISTING INFRA-STRUCTURE AND PROCESS PLANTS
• VERTICAL/HORIZONTAL DIVERSIFICATION POSSIBILITIES
• IDENTIFICATION OF NEW TECHNOLOGIES (INDIGENOUS AND FOREIGN)
• SOURCING OF THESE TECHNOLOGIES
• PREPARATION OF THE 5/10 YEAR TECHNOLOGY PLAN

Technology Development through Partnerships

Why to Partner

• Minimizing the cost of carrying out the R&D work – taking advantage of the salary structure in the developing nations
• Issue of specialization,
• reinventing of wheel should not be done
• Locational advantages of partners
• Need for involvement of group of experts

Who to Partner

• Innovators: Idea generators
• Engineering organization - prepare the detailed process flow diagrams, designs of the process equipment/prototypes, plant layouts, designs of the utilities (power, water, steam, compressed air, pollution control systems and building designs etc.).
• Equipment Prototypes fabricators and suppliers of plant and machinery
• Certification/testing agencies
• User Testing Agencies
• Organizations for protecting Intellectual Property Rights
• Technology Funding Agencies
• Market Survey Agencies
• Licensee/Sub-Licensee
• Government (TBTs)
• Technology Transfer Organization

IP Protection of Technologies

Types of IPRs

• Patents (Product and Process) and Utility Models (Including Business Method Patents).
• Copyright and related rights (including Data Protection).
• Industrial Designs.
• Trade Marks (including Collective, Certification and Service marks)
• Confidential Information (Trade Secrets).
• Layout Designs of Integrated Circuits (ICs).
• Geographical indications and indications of source and appellations of origin.
• Plant Varieties and plant Breeders Rights.
IP Strategy Development

- Evaluating the potential of an R&D result for obtaining IPR
- Evolving strategies for more effective protection at minimum staggered cost
- Cost of obtaining and maintaining IPR
- What to file (relevant IPRs), where to file, When to file and How to file? Countries, Regions (EPO), PCT
- What Route to follow particularly in respect of patents, design registration and registration of integrated circuits?

IPR Business strategy Tricks

- Use of “Patents of Addition” to reduce costs (as much as Rs. 50 lakhs)
- Extend life of patent by first filing product patent and then process patents, particularly for new chemical entities.
- The 42-month patent marketing war.
- How to detect patent infringement.

PATENTING ABROAD - OPTIONS

A) SEPARATE NATIONAL APPLICATIONS
B) EUROPEAN PATENT CONVENTION
C) PATENT COOPERATION TREATY
D) OTHER REGIONAL PATENT SYSTEMS
- ARIPPO
- OAPI
- EURASIAN
Technology Development Funding

- R&D Funding Options Available

- Criteria for Funding:
  - IPR Status
  - Stage of development (idea, pilot plant/prototype, semi-commercialization)
  - Complexity of Technology
  - Status of IPR developer
  - Status of Technology receiver
  - Number of Partners involved in the IPR development/commercialization and their role.
  - Quantum of funds required
  - Type of Technology Sector
  - Gestation period of development & commercialization

Technology Transfer

Steps in Technology Transfer
1. Marketing of technology
2. Technology evaluation – technical and commercial
3. Determination of market potential
4. Preparation of comprehensive know how documents and maintenance of Lab note book
5. Formulating a strategy for technology transfer.
6. Preparing a budget for technology transfer

Mechanisms for technology transfer

Formulating a Technology Transfer Strategy
- Territory Exclusivity
- Period Exclusivity
- Application Exclusivity
- Co-exclusive Territories
- Multiple Licensing
- Cross-Licensing
- Buy-Back Arrangement
- Mother Licensee Concept
- Transfer of technology through sale of machinery with embedded technology.
Twin-Screw Food Extrusion Technology For Value Addition to Agricultural and Dairy Products

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BASIC TECHNOLOGY (P) LTD., KOLKATA (Email – smscientech@sify.com)

Both Prime Minister & Finance Minister expressed their worry about poor growth of agricultural sector resulting in a distorted overall growth of economy. The tremendous growth potential of service sector and to some extent manufacturing sector and poor job prospect in rural area inducing migration of able-bodied to urban area leaving old, infirm, woman and children in rural home creating social problems and also causing lower agricultural production. In fact, some economists and planners are skeptical about the availability of adequate quantity of food-grains to feed the nation in future. “India is the potential hungry capital of the world! (press-report) It may be mentioned that the tremendous growth of service sector is demand-driven, caused by enhanced need of developed countries and a section of our population are well disposed to grab this opportunity. But what about the fate of teeming population who are not capable of taking this opportunity?

If we are to maintain a healthy growth in economy we must have a proportional growth in all sectors of economy i.e. service, manufacturing and agriculture. For agriculture sector the growth is possible through the application of modern technology with proportional development in irrigation. Bane of Indian agriculture is perishability of products, drudgery, post-harvest loss, in-efficient marketing potential, uncertainty in marketing, vagaries of nature – factors umpteen. Application of technology could alleviate some of the problems which has been proved in white revolution in Gujrat. Blue revolution is another potential area now enjoying 4-5% annual growth – another potential area of development - both for economic growth and enhanced nutrition status of population thus maintaining productive capacity of nation, cutting down the national health budget. Dairy is another sector which generates wealth is rural area at the same time contributing nutrition to the masses, if modern technology is applied for value addition to conventional products.

One of the technologies which has a great potential in alleviating this adverse situation of Indian agriculture is Twin-Screw Food Extrusion technology applied to food processing. This technology is well proved in developed countries matching the fast life-style and healthy living providing convenience-food in the form of 'ready to eat' nutritious shelf-stable food. The main component in technology is the processing machines to convert the agricultural products to a customer-savvy products matching the need of market and economy. In developing countries Twin-Screw Food Extrusion technology can effectively solve some of the unfavourable situation mentioned before, be it in agriculture, in fishery and in dairy sector. The subject of this discussion is primarily on post-harvest processing to marketable products manufactured by small scale units - to utilize the local resources, to cater local need (like institutional feeding programme for which government has provided enough budget) and also through commercial marketing chain. Extruded food products answer the need of market eg. acceptability, shelf-stability, amenability of modern packaging and economy of scale. Fortunately, MNCs have popularized extruded food in India through intense propaganda in electronic media – targeted mainly to children – specially in urban area for snacks and meal replacement. Indian, entrepreneurs – mainly SSI can take advantage of this marketing activity – provided the quality and pricing are competitive. Indian agriculturists are intelligent, efficient and hard working – seasoned with the vagary of nature. If they are given adequate training and assistance and allowed to fend their own growth centers in rural area, they can sustain itself as proved in Amul project in Gujrat.
Now let us discuss the technology Twin-Screw Food Extrusion process which can create growth opportunity in rural sectors – specially for small enterprises.

Extrusion-cooking, one of the most important innovations of past few decades, first started its journey in the field of plastic – the method of plastic processing is very simple: melting, micro-mixing, transporting and forming highly viscous media which is ultimately formed in to strands and pellets. The application of extrusion in food and feed industries established itself for producing crunchy foods – snacks and break-fast cereals and for animal feed and in particular pet food and high quality fish-feeds.

The mechanical feature of extrusion, in simple form, is an Archimedean screw moving inside a barrel. The feed materials is fed and screw transports it under high pressure (generated by the screw & barrel fitted with a die on the other end) and finally come out from the die. Twin-screw Extruder (TS Extruder) is an improved version in which tip of one screw wipes the cavity of the other screw thus high shear generates intense heat which cooks the food. The product containing water is super-heated in the barrel and when coming out of the die to atmospheric pressure, flashes out as steam resulting the porous structure which is crunchy because the starch and carbohydrate form rigid foamy structure.

What is cooking?

Cooking is gelatinisation of starch/carbohydrates and de-naturisation of proteins so that living animal can metabolize it for energy, body building and stay healthy. Extrusion technology is an efficient method of cooking but with some special advantages as noted below:

- Low cost – Labour requirements and processing space per unit of production are less than for other cooking /forming system.
- Product characterisation – A variety of shapes, textures, colour and appearance can be produced.
- Energy efficient – Cooking is performed at low moisture so less drying is required and due to mechanical shear heating, it is highly energy efficient.
- New foods – Most carbohydrates and protein ingredients can be processed to increase product variety.
- No. effluent – Few solids are lost and defective products can be recycled, no loss of materials, no liquid effluents, no gaseous effluent like wood/fuel stoves causing indoor pollution.
- HTST effect – High temperature-short residence time effect destroys bacteria, yeast, spores, anti-growth factors (like trypsin-inhibitor in soyabean) but the food products are not damaged. Fat-splitting enzymes present in fat/oil are also destroyed preventing rancidity resulting in longer shelf-life of products. The original hydro-thermal cooking which we follow in our house-hold / industry can not manage these dangerous materials and can not produce pasturised product, if proper care is not taken.
- The extruded products are amenable to packaging without further drying or after short-time drying.
- ‘Ready to eat’ convenience food without further heating or with little heating (two minutes noodle).

The above factors make extruded foods an economical and accepted food.

Food technologists predicted that ‘instant noodle’ would be world dish in future. It started in China and then invaded South-East Asia and now being spread in India. USA and Europe already accepted it. It is sure it would prevail in Indian household as children – the Lord of the Manor accepted it.
Before discussing other aspects of extrusion-cooking, the development of special mechanical features of extrusion-cooker may be discussed. In seventies an improved version of extrusion cooker has been developed eg. TWIN SCREW EXTRUDER in which two screws work inside the barrel. The most popular version of this extruder is two screws rotating in the same direction – tip of one screw wipes the cavity of the other screw thus inducing positive displacement of products inside the barrel minimizing jamming/burning of products which are so very prevalent in Single Screw Extruder. Twin Screws also induce micro-mixing inside the barrel in presence of gelatinized starch thus micro-nutrients are irreversibly distributed in the product which are locked in gelatinized starch. The advantages of Twin Screw Extruders are summarised as follows :-

- In TS Extruder, tip of one screw wipes the cavity of the other screw inducing positive displacement minimizing blocking, jamming and burning of products.
- In TS Extruder, micro-mixing takes place resulting in uniform distribution of even small micro-nutrients – irreversibly – as simultaneous production of gelatinized starch permanently fixes the micronutrients in position.
- Due to high temperature short-residence time (HTST) effect bacteria, anti-growth factors (as trypsin inhibitors in soyabean) are destroyed and safe food is obtained. Fat splitting enzymes which cause rancidity are also destroyed resulting in longer shelf life of extruded products.
- Due to presence of gelatinized starch in extruded products, it has mechanical strength which prevents crushing of products to powder during storage, handling and transportation.
- TS Extruder for feed industries can handle high moisture content of fish processing waste material (80% water) as against S.C. Extruder which can process max. 30% moisture content. Similarly TS Extruder can process 22% Fat in feed materials to make high energy feed as against 4% for single screw extruder.
Twin Screw Extrusion and RTE Nutritious Food.

As explained, TS Extruder is ideal for making ‘ready to eat’ (RTE) food based on inexpensive feed materials like broken rice, broken dal (pulse), soyabean & other oil seed, legumes, millets, tubers etc. and fortified with minerals, vitamins, synthetic amino-acids and micro-nutrients make ideal products for institutional feeding programmes like mid-day meal for schools, disaster relief programme and even for ‘food for work’ projects. Since the process does not require any fuel (like wood or other cooking fuel) and cooking is done mechanically (shear-cooking) it saves the environment as woods etc need not be collected. Similarly extrusion does not emit any effluent gas and cause any indoor pollution - a serious health hazard for housewives. Again the cooking energy requirement is 10% to 20% of conventional wood oven – a great saving of energy. As for example, supreme court directed that school mid-day meals should be cooked and the conventional cooking in schools would require elaborate arrangement requiring labour, fuel, involving both liquid and gas effluents. Also the conventional process of cooking involves different steps which means loss of materials and most importantly pilferage – an universal traits in such project. On the other hand if the schools receive extruded food from local extruded-food manufactures, it avoids the hazard of labour, pollution and pilferage. The extruded products are amenable to packaging having longer shelf life, easily quantified and easy to maintain stock-account. To make the extrusion technology viable, Food Technology Institutions have to play a significant part : based on locally available cereals, potato, coarse grains, dal, fish etc. they can develop the extruded products to achieve crunchiness, crispness, mouth-feel etc suited to the native taste.

Health Food & Nutraceuticals

Twin Screw Extruders play a significant role in this field also. Due to excessive cost of drugs and for other reasons people are inclined to use healthy natural products in their food. But how to deliver the goodness of natural products to the masses? The answer is : co-extrusion of natural metabolites with cereals. It first started in developed countries to counteract excessive intake of meat and less fibre resulting in preponderance of colon cancer. Co-extrusion of cereals with high fibre-content (bran) make a healthy breakfast cereal. These products also give a fullness-feeling suppressing mid-morning hunger preventing frequent snacking (which causes obesity - a serious ailments).

Twin Screw Extrusion and fibre

Excessive fibre in Indian coarse grains, dry land crops eg. millets, tubers, legumes etc. grown in our country is causing problems as it locks minerals and prevents its assimilation. Then again excessive fibres would induce higher intestinal mobility specially in children, giving less time for assimilation which also often cause diarrhea. Extrusion cooking tends to convert the fibre to take a more sugary structure so that the ill effect of fibre is reduced.

Micro-nutrients and Twin Screw Extrusion

The intervention programme on micro-nutrients poses problems as administration of these (eg. iron, vitamin A etc.) on empty stomach produce ill effect. Micro-nutrients co-extruded with cereals would produce a calorie-dense products and its effect will be fruitful.

Extruded Product for growing markets

- Extruded crisp snacks – Flat bread, cookies, bars etc.
- Expanded breakfast cereals – Flavoured, coated with chocolates etc.
• Indirectly expanded products, (half-product): snacks or cold formed products requiring simple processing at home.
• Pet foods – With nutrients
• Aqua feed – Both sinking type and floating type, to stimulate growth, reduce mortality, improving muscle texture of fish.
• Texturised Proteins – High value protein enrichment for human and animal food & Feed stuffs, by texturising de-fatted flour, protein concentrates and isolates to partially replace meat in the meal – a healthy practice and also protein and fibre enrichment.
• Flour and starch – In order to satisfy the specific demands of food and industries, flour and starch can be physically and chemically modified eg. acid hydrolysis to dextrins, esterification with carboxymethyl cellulose etc. and protein and fibre enrichment.
• Instant products – Instant drink and infant feed powder (instant soup)
• Casseinates – Conversion of casein to casseinate. Bacteria reduction, better wetability and solubility improvement.
• Liquorice / Fruit gums – These are cooked, flavoured, coloured and extruded continuously without need of final drying.
• Chocolate – Pasturisation, caramalising process and Maillard reactions.
• Chewing gum & Bubble gum – Extrusion offers a continuous process. Bubble gum production is an example.
• Reaction – Chemical modification of starch.
  Graft polymerization of starches.
  Enzymatic material conversion.
  Deactivation of enzymes.
  For Maillard reaction eg. production of chocolate crump, kilned malt roasting flavours.
• Biotechnology – Substrate production.
  Cellulose hydrolysis
  Starch conversion.
  Wood break-down for paper production.
  Wood break-down for animal feed.
  Preparation of fermentation feed as extrusion increases fermentation rate and increase final concentration of alcohol.

It is often mentioned by experts that the range of novel products obtained from Twin-Screw Extruders is limited to the imagination of research workers. Here are some examples - some of which are already in market and other are under marketing trial.

1) Cheese-analogue prepared from calcium caseinate and butter oil, enzyme modified cheese (EMC), cheese flavour.
2) Fat analogues – from mixture of whey isolate (WPI) and water (77%)
3) Jelly confectionery, licorice, chocolates & condiments.
4) Healthy breakfast food, flat bread fortified with milk powder, milk proteins.
5) Bio-degradable packaging materials from starch, Bio-degradable buttons from casein.
Fish-Feed and Twin Screw Extrusion

Twin Screw Extrusion has a tremendous part to play for fish-feed which constitutes 60% of revenue expenditure of aquaculture project. The same extruder can produce both sinking and floating feeds. The special advantages of extruded feed are:

- Due to gelatinized starch, the feeds are water-stable and have high mechanical strength and crumble-proof. The feed made from pelletizer with inefficient gelatinisation produces dust during handling which pollutes the water.
- Due to destruction of micro-organisations the feed is pasturised with anti-growth factors, bacteria destroyed.
- Due to generation of high pressure, fish-feed of low diameter say 1 mm (suitable for fish & prawn fry) can be produced.
- High fat content fish feed say 20% fat is possible.
- High water content materials like fish processing waste can be used solving its disposal problem.

The prime mover of small enterprise is the processing machines which will convert the agricultural input to industrial product. The Twin-Screw Food Extrusion has to perform various function like gelatinisation of starch, denaturisation of proteins for easy digestibility, destruction of anti-growth factors, bacteria, moulds, mycro-toxins, allergens and rancidity producing fat-splitting enzymes. As such, very critical design factors and control systems are required. A twin-screw extruder for polymer processing can not function as efficient food extruders. Another critical factor is genetic variation of tropical cereals containing high-fibre which can not be processed in imported food extruders as these are not designed for high-fibre grains. In fact, to make a small-scale Twin-Screw Extruder it should be more sturdier, more versatile and its critical component should be over-designed to match the skill of Indian operators. Another detriment toward the utilization of foreign made Twin-Screw Extruder is very high price and higher out-put rate. Both on the price front and economy of scale, an indigenously designed and built Twin-Screw Extruder is needed for product development and small-scale industry.
Experience of A Fresh Start-up Company in Food Industry

MR. A. BHATNAGAR
CEO, Aavishkar Industries, Pune

What makes a man tick?

Life is a process of ‘constant change’. A person keeps on evolving till he/she breathes. The needs change, and this leads to his/her taking radical decisions.

What one dreams of?

Of being his own master or Working in a team or being the strongest link in the chain

Do the dreams die first?

Maybe, but it cannot stop me from dreaming.

What do I need: Security of a fixed sum every month (can be translated into living in a cocoon or your own compartment) or going out becoming someone who provides these to others.

Decision to let go:

1. Painful, with lot of thought. It is similar to a new life, a new beginning. I took the step with a lot of trepidation.
2. What do I loose: The biggest obstacle was to overcome the fear of getting out of the ‘comfort zone’.
   From a ‘Senior Management’ position in a reputed company, to start anew company, is akin to starting your career afresh.
   It is a very difficult change for the family to accept. My wife felt worried, uncertain about the future, & my children felt bewildered. The disruption of lifestyle.
3. What do I gain: I felt the challenge, of succeeding against the odds.
   My time became mine to manage.
   I have to juggle with my finances (which were meagre).
4. If I do not succeed what is my back-up plan: I did not have a back-up plan, other than going back to work for a company.
5. How long do I give me to make a mark: I gave myself 3 years to establish myself.

Experiences of behavioral changes after taking the plunge:

1. I started looking at the things differently: for example in an organisation, the usual compartmentalisation offers you an excuse of doing a thing upto a certain extent, & then it becomes someone else’s baby. Here you have to take it to the end.
2. You become the decision maker: Its quite scary in the beginning, as fear of making a mistake is always there. But you learn to take it into your stride.
3. People react to you differently: issues get settled fast. As people realise you mean business, they start respecting you.
4. The relationships change: You become an owner instead of a representative of an organisation, your word is final, from your side, in a one to one transaction.
5. You have to be on your toes 24/7, looking for opportunities, trying to find work. Your senses become acute, you become more conscious of others’ needs.
6. You become flexible, less rigid.
7. Your character gets tested
Preparatory Steps: I was thinking about starting on my own for close to five years, before I took the final step. In year 2001 (somewhere during the summers) I started putting things on paper, the process which (in the jargon everybody loves & gets impressed by) is known as – “Building a roadmap”.

**My roadmap consisted of the following:**

1. Identifying my Core strength
2. Knowledge of processes involved in my future enterprise.
3. Concentrating on improving my Expertise
4. Identifying my selling point
5. Analysing whether my expertise is needed & is useful to the industry

**The answers to the above were encouraging, & I started setting up goals & miles-stones.**

1. **Short Term Goals: (0 to 2 years)**
   - A. When to start my company.
   - B. Whether to start while I was working, or wipe the slate & start afresh.
   - C. Finances for start-up & running expenses for your family
   - D. Given the state of my finances, what will be the form of my company. Do I need tie-ups
2. **Medium Term Goals: (2 to 5 years)**
   - A. Asset Building with the help of financial institutions
   - B. Certifications/Accreditations like ISO, CE marking
   - C. Product Mix
3. **Long term Goals: (5 to 7 years)**
   - A. Public Issue
   - B.Turnover Targets
   - C. Image of the company

**Start-up:**

Governemnt Registrations
- Company Constitution
- Bank Account

Getting The first Order:
- References & Contacts: usually the most difficult. In my case it was contacts

Expanding the Client base:
- How to leverage you’re your plus points
- Preparation of Profile
- Prospecting for Customers
- Meeting prospective Customers

Conclusion: A correct decision. Enjoying the challenge. Felt a new vigour. The old jadedness is gone.
Role of Technology Business Incubators in Promoting Entrepreneurship

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Background

The formation and growth of knowledge based technology driven industries depends upon the conductive environment and the entrepreneurship potential of the region. Infrastructure in general, more specifically the state-of-the-art common facilities technology incubation centres, have very high leveraging effect on the growth and performance of start-ups and SMEs in any region. The technology facilities not only support and improve the performance of existing SMEs, but also provide them a conceptual target of a higher altitude of performance in the global market place. The institutes of higher learning and research are the seedbeds of new ideas and technologies.

Integration of academic and research institutions with business enterprises resulted in the establishment of Science Parks, Technology Parks and Research Parks, which were started in the USA in 1950s. Subsequently, these initiatives gained acceptance the world over as these helped in the promotion and growth of New Technology Based Enterprises (NTBEs), in generation of additional avenues of gainful employment and also as an additional source of income for academic institutions to support it’s scholastic and research activities.

In order to effectively propagate the utility and application of technological developments to end users, it is essential that timely translation of these developments in form of marketable products and services takes place. Further, the technology based and knowledge driven enterprises are characterized by two distinct features i.e. high growth and high risk. These features coupled with time to market have necessitated development of special mechanisms to nurture innovation and entrepreneurship. Science and Technology Parks essentially provide a conductive environment to nurture new enterprises whereas a business incubator besides this also provides hand holding, mentoring, specialised support services and networking during the critical period of an enterprise i.e. the start-up phase.

The primary goal of a business incubator is to foster economic development by improving the entrepreneurial base. For this reason, most of the incubators are directly operated by the national or local government. Others, however, have been established by universities or private non-profit organizations, and links with government can vary greatly, from strong to nearly non existent. The development of business incubators calls for a national strategy and for interaction between government authorities, the private sector and local institutions, universities and research centers.

Global Scenario

Incubator programs have been established in many countries to stimulate creation of technology-oriented small businesses. At present, there are nearly 4000 incubators of various types operational in the World. In USA, there are more than 1000 incubators including about 200 Internet incubators. Europe has nearly 1000 incubators including 300 in Germany. Among the developing countries, China has shown exponential growth in the incubators and over a period of ten years has set up almost 400 incubators. Most of them are linked to HEIs. Korea too, is reported to have about 300 Incubators while, Japan, Malaysia and Singapore are
catching up. Incubators have been shown to reduce the failure rate of small businesses by providing training and guidance to such companies in their initial stages. Small businesses have been responsible for creating wealth and jobs worldwide. High-technology incubators have been particularly successful in U.S., Israel, and China.

To promote start-up ventures of young entrepreneurs, an incubator provides a spectrum of entrepreneurship development initiatives covering, Training, Nursery incubator space during the initial gestation period, Central Common Manufacturing facilities, Systems and Networking support, catalogue library etc. These facilities considerably reduce the initial investment commitments of the entrepreneurs thereby reducing the risk. Common Facilities such as Workshops and manufacturing facilities, Computer Networks laboratory facilities etc., have always been a boon for budding enterprises. The ready availability of mundane requirements for new ventures also motivates entrepreneurs to take up their new ventures enthusiastically and enable them to concentrate on core competency development more. The availability of on-line consultancy from a team of management and technical professionals, to analyze various business propositions and to develop suitable business strategies, provides budding entrepreneurs greater impetus. The core competencies of the parent institution constantly reinforce the technological innovation of the new ventures of the young entrepreneurs.

Incubators exist in many forms, with different objectives. These may be:

- Public or not-for-profit incubators sponsored by government and nonprofit organizations, whose primary purpose is to promote economic development.
- Private incubators run by venture and seed capital investment groups, or by corporations and real estate development partnerships. These incubators generally seek a return on their investment, often through a stake in the firm, further development, royalties, etc.
- Academic-related incubators, which share characteristics of the first two types, but also have objectives in faculty development, and creating business spin-offs from faculty research.
- Public/private incubators, which are joint efforts between government or other non-profit agencies and a private developer. These offer the advantage that government funding can often be secured to support private sector expertise and financing.

Benefits from TBIs

For tenants

It enhances the chances of success, helps overcome market failures, and facilitates access to mentors, information and seed capital.

For Governments

The incubator serves as an economic development tool, promotes regional development, and generates jobs, incomes and taxes.

For research institutes and universities

The TBI helps strengthen interactions between industry promotes research commercialization, better use of lab facilities and gives opportunities for faculty/graduate students to enhance their capabilities.

For corporate sponsors

The TBI can develop opportunities for acquiring innovations, supply chain management and spin-offs, and helps them meet their social responsibilities.
For the community

Creates self-esteem and an entrepreneurial culture, as a majority of graduating businesses stay within the area.

Initiatives Taken in India

India has made commendable progress in terms of the growth of scientific and technological culture. Today, India has a vast pool of S&T infrastructure with over 1200 technical institutions including around 300 universities. The estimated annual out-turn of the engineering graduates is around 3.80 lakhs. In addition, it already has a critical mass of cutting edge research through 400 National laboratories besides over 1300 in house R&D units in the corporate and other sectors. However, the environment and support system are not congenial for faster commercialisation of R&D outputs and there are several barriers to the same. In majority of cases, the R&D outputs do not get commercialized for want of initial investment, the needed enabling environment and networking. In the recent past, the Department of Science and Technology, Government of India, has been focusing its attention to plug the existing gaps and has initiated a number of institutional based programmes. These include the mechanisms of Science & Technology Entrepreneurs Parks (STEP) and the recently launched Technology Business Incubators (TBI).

Science and Technology Entrepreneur’s Park

Science parks and similar initiatives create an atmosphere for innovation and entrepreneurship for active interaction between academics & industries, for sharing ideas, knowledge, experience and facilities enabling the conversion of job seekers to job generators.

Technology Business Incubator

Synergising with the emergence of India as a globally renowned knowledge superpower, the National Science and Technology Entrepreneurship Development Board of the Department of Science and Technology has initiated a mechanism of Technology Business Incubator (TBI) for promoting knowledge-driven enterprises and generation of value added employment using cutting edge technologies. As compared to STEP, a TBI is ought to adopt a more focused approach in promoting technology based new enterprises through a package of value added services offered during a limited tenancy period (usually 2-3 years).

The TBIs are aimed at achieving the following objectives:

• Enterprise & Entrepreneurship Development: An appropriate tool for economic development by promoting technology/knowledge-based businesses, culture of technopreneurship and creation of value added new jobs.

• Technology commercialization: To provide a much needed platform for speedy commercialization of the technologies developed in the academic and the R&D institutions to reach the end users.

• To provide an interfacing and networking mechanism between Academic, R & D institutions, Industries and financial institutions.

• To provide value addition through its services provided to its tenants as well as to the existing technology dominated SMEs.

• To provide R&D for industry: It also enables small industry to take up R&D activity and the technology upgradation activities.
Service Programme of TBI

A TBI is a managed workspace with shared office facilities with emphasis on business and professional services necessary for nurturing and supporting early stage growth of technologies and technology based enterprises. The services may include common services such as a well equipped workspace, Communication Facilities, Phone, Fax, Internet and other shared services including secretarial assistance etc. Business Support Services, Business Skill Development, Business Planning & development, Business Management, Networking with stake holders. The Specialized Services may include Engineering & Design, Research & Development, Testing, Legal, IPR related. A TBI is also expected to assist the start-ups in getting access to financing such as Venture capital support, funding from angel investors, other innovative financing mechanisms including equity participation.

Location

Ideally a TBI should be located near a source of technology and knowledge i.e. around R&D Institutions/Academic institutions or it should have formal links with such institutions for facilitating easy access to the expertise and facilities available in such institutions on the one hand and keeping the cost of such knowledge inputs to the TBI on lower side on the other. Therefore, select Higher Educational Institutions (HEIs) and Universities are being targeted which are acclaimed as reservoirs of knowledge and generate high quality professionals.

Funding Mechanism

A TBI may be promoted jointly by the selected host institutions (government/privately aided) and DST. The contribution of Host Institute is essentially towards land, building, furnishing, renovation and utilities of the TBI. In addition, the host institution has to play an important role not only in the establishment of the TBI project but also in its smooth and efficient functioning. If needed, other relevant agencies including the state government could also be involved as sponsors. The TBIs being supported are either focused incubator in the sunrise areas of the technology like biotechnology, information technology, advanced materials and manufacturing technology etc or have mix of 2-3 areas of technology. TBIs operate as a separate entity of the institution; exact status would vary from case to case. As a policy decision, the Department provides funds on capital account for creating essential facilities, procuring necessary equipment, hardware and software in the chosen area(s) of technology. The government also lends support to the TBIs for meeting their operational/recurring expenditure during the initial 4-5 years. Given the understanding that a TBI is to be managed as a business itself, the activities and services are so tuned which enable a TBI to be self sustainable after a specified period of time. In order to sensitive and popularize the concept in a planned and structured manner, DST organizes an International Conferences & Workshops to share the global experiences. Further, the Department has been collaborating with UNDP, APCTT, UN-ESCAP for securing partners and establishing international linkages for the incubator programme. Recently, as a part of its global initiative, it has joined hands with the infoDev programme of the World Bank and major activities are being implemented now. The European Union also is associated in sharing the good practices of business incubation with the Indian incubator managers.

At National level, recently DST has associated with the University Grants Commission (UGC) and the Ministry of Small Scale Industries to popularize the concept of Knowledge based Entrepreneurship Promotion (KBeP) among Indian Universities.

STEPs/TBIs Location

Over 15 STEPs have been set up by the Department in various technical institutes of the country as shown in the map. Some of the successful STEPs are located at NIT Trichy, NIT-
Surathkal, SJCE Mysore, PSG-College of Technology, Coimbatore and IIT Kharagpur. Over 12 TBIs have been established by the Department in several Institutions of excellence in well identified thrust areas as shown in the map given below. Most of the Incubators are of recent origin and are at various stages of development.

Successful Launch of Technology Business Incubators

Some of the suggested steps being envisaged for the successful launch of a TBI are as follows:

- Select a location after careful evaluation with a clear mission and business plan.
- Sound financial support both from Central and/or State governments and other related agencies.
- Structure the Incubator to provide value to Tenants and stakeholders.
- Careful Selection of tenant firms with highest growth potential.
- Appoint a proactive management board for overall guidance and a dedicated team led by professionals for day to day operations.
- Identify & develop a panel of professionals who provide critical support services for start-ups.
- Facilitate access to venture capital scheme and other innovative financing mechanisms.
- Effective networking with other R&D institutions for making the TBI a focal point for technology in the region.
- Be customer service focused with both tenants and stakeholders.
- Build an effective monitoring mechanism.

Conclusion

For the developing economies like India in order to align with the changing paradigms of business and education, we have to gear ourselves to promote entrepreneurship through instruments like incubators and translate its benefits for the development of the economy and the nation. This is perhaps the only way to ease pressure on the already tight job markets and create new opportunities for the large population that we have in this country. This is also a sure way to keep the country on high growth rate trajectory for a long period.
Entrepreneurship Promotion in Dairy & Food Industry

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I am indeed very thankful to the Dairy Technology Society for giving me an opportunity to express my views on this important subject. The theme of today’s workshop on ‘Entrepreneurship Promotion in Dairy & Food Industry’ is very much relevant in today’s scenario. Its relevance is more evident in this region because the agriculture has already its saturation and there is hardly any scope of further remunerative development. Dairy farming and food industry can provide the much needed sustainability in agriculture. The concept of ‘Entrepreneurship Promotion in Dairy & Food Industry’ is a noble one for attracting the farmers towards this concept to uplift them.

The successful of an entrepreneurship depends on its financial standing or financial support available from the Financial Institutions because without adequate financial back-up, no entrepreneurship can ever think of complete success with sustainability. The Financial Institutions have floated numerous schemes, which provide financial support to the upcoming entrepreneurs at very reasonable interest rates. This support is project specific. Therefore, the upcoming entrepreneurs have first of all to be well aware about the pit falls in executing the projects. They need to be thorough about the demand of their product before pumping the money let it becomes their waterloo. A number of Cooperative Societies and Self Help Groups have been formed by the farmers to promote dairy farming in the villages in this region. This is an effort in right direction which needs to be encouraged. However, it has been observed that in most of the cases, the loans taken by such bodies for purchase of cattle/buffalo are directed to meet other domestic purposes such as solemnizing marriages of sons and daughters and purchasing articles of domestic needs. Thus, the very purpose for which such schemes are floated, become non-starters. The result of such practices is that the loans keep on multiplying and such farmers are caught in a piquant situation leading at times to suicides. This tendency needs to be curbed.

Management has an important role in any successful entrepreneurship. Without an efficient and honest management, no entrepreneurship, howsoever financially sound it may be, can sustain for long. Management is the steel frame of an entrepreneurship on which the whole edifice is based. For this, proper education and expertise in management is essential. In dairy farming, management means, feed and disease management and future projections keeping in view the over all scenario. Replacement of uneconomical cattle with upgraded ones is also an important function of the management. An efficient management is destined to drive the entrepreneurship to sky heights.

Introduction of modern and latest technology are also the most important ingredients for making an entrepreneurship successful and sustainable. It is the most essential component to face competition and challenges from the market players particularly the Multinationals which are posing a serious challenge to our entrepreneurs. The technology has to be commensurate with the local conditions. Any technology howsoever modern and efficient it may be, cannot fit into the Indian local conditions mutatis mutandis. In the context of dairy farming, it has been observed that the experiment of importing foreign varieties of cattle has not been found to be very successful due to local conditions in which they could not adjust. So, we have to evolve our own system of dairy farming and food processing technology. The farmers of this region particularly Punjab, Haryana and Himachal Pradesh are very hard working. Their adaptability is unbeatable. They have established their mettle the world over. They do not want any charity but opportunities.
The other foremost component for any successful entrepreneurship is the quality. Quantity has its own significance to reduce the cost of production. But production without quality is a liability. Here, the farmers whether in agriculture, dairy, horticulture, fisheries or poultry or any other related allied activity, are facing the problem of rising prices of inputs and controlled support price which is not commensurate with the cost of production or market price in most of the cases. This is a big constraint in producing quality product. In dairy farming, the vendors resort to unfair means of mixing water with milk thereby tarnishing the fair name of the trade. Today, India is the biggest milk producer in the world. Still, we stand no where in the world market.

There is tremendous scope of capturing world market for milk and milk products. But we are lacking in maintaining world standards. We have Multinationals operating from India, who are having booming business of milk and milk products simply because they maintain world standards. Nestle India Ltd., is one such organization. They have been operating in India for the more than four decades. They are providing veterinary services to those dairy farms which are committed to deliver milk to Nestle only. Nestle has even set up small chilling units at the farms for the convenience of the dairy farmers and protect the milk from bacterial formation due to long haulage from the farms to big chilling units.

The last but not the least essential things is marketing. It has been observed that the farmers have ventured into new experiments to grow diversified crops and also setting up dairy farms. But in the absence of proper marketing system, they have found themselves at the mercy of the market players, who often fleece them and deprive them of their well deserved income. The small and marginal dairy farmers are at the mercy of the local vendor (Dhojis) or the procurement agencies.

Of course, Milk Cooperative Federations have stepped into the market for collection of milk from the door steps of dairy farmers, but their criteria of fixing price as per the fat content is again baffling the dairy owners. No doubt, with the stepping of these Milk Cooperatives, the dairy farmers have been saved from the hassles of ferrying the milk to the market but they are still not getting fair price of their milk. Even for adding another head of cattle, they has to knock at the doors of a money lender because due to being uneducated, he does not know about other avenues.

Food Industry has its own role for Entrepreneurship Promotion. In the present scenario, the farmers can diversify their activities towards value addition of agricultural commodities. Food Processing has a very bright future. With the right kind of technology and adherence to quality, we can open wide vistas of marketing for processed food within the country and abroad. Value addition process multiplies the value of the basic product thereby providing fair share of profits to the producer.

To encourage our farmers in food processing and dairy operations, it is imperative that they should be provided with facilities/incentives in the following forms:

1. Electricity charges should be charged from dairy farmers and food processing farmers at the same rates as are being charged for agriculture.
2. The agriculture income is exempt from income tax, the same treatment should be extended to the dairy and food processing farmers. It should be treated as agricultural activity. If it is done, even educated younger generation will happily adopt dairy and food processing as a profession. It will not only encourage the younger generation towards this profession but also create additional employment opportunities and avenues for becoming successful entrepreneurs in the rural areas.
3. The present system of Double-Axis Formula for purchase of cow and Buffalo milk should be modified. The milk of cow and buffalo should be treated at par for fixing price.
rate of milk should not be fixed on the basis of fat but on SNF basis. It will encourage the dairy farmers to go for large cattle herds making it more economically viable.

4. The loan for dairy farming should be on concessional rate, longer period of moratorium and the repayment schedule should also be not less than 10 years so that the dairy farmer is left with sufficient funds for meeting his domestic and social needs.

5. Govt./Non-Govt., agencies should be assigned the job of procuring high quality semen having lactational yield of not less than 15,000 ltrs., and making it available to the dairy farmers at their door step. It will revolutionalise the dairy farming and establish it as a full fledged profession which, at present, is just a domestic profession.

6. Milking machines should be provided to the dairy farmers on subsidized rates or on rental to encourage them to modernize their dairy farms.

7. The dairy farmers should also be allowed to prepared their own cattle feed for their own use without subjecting them to regulatory controls sales tax/VAT Laws. This will save them from the adulterated or poor quality cattle feed being marketed by unscrupulous traders. Free of cost short term training should also be arranged by the Agricultural Universities for the farmers to educate them about setting up economical feed manufacturing units and preparing quality cattle feed.

8. Insurance Cover for the animals should be provided with subsidized insurance premium and the payment of claims should be made promptly.

9. The most important thing is to provide sustainable marketing for the processed items of the dairy and food processing farmers so that they do not have to be at the mercy of the market players. To provide easy accessibility to the farmers, processing industry should be located close to the cluster of villages. The processed food items could be dispatched out to the big towns and cities for marketing. It will provide incentive to the farmers and save them the drudgery of making rounds of the towns and cities.
Role of Venture Capital and Financial Institutions in Promoting Enterprise

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Origin and Objectives

Small Industries Development Bank of India (SIDBI) was set up as a wholly owned subsidiary of Industrial Development Bank of India (IDBI) in April 1990 under an Act of Indian Parliament as the principal financial institution for

- promotion
- financing
- development of industry in the small scale sector, and
- co-ordinating the functions of other institutions engaged in similar activities

Since its inception, SIDBI has been assisting the entire spectrum of the SSI sector including the Tiny, Village and Cottage industries through suitable schemes tailored to meet the requirements of the setting up of new projects, expansion, diversification, modernisation and rehabilitation of existing units.

Domain of Service

The Small Scale Industries (SSI) sector occupies an important place in the Indian economy in terms of its contribution in generation of employment, output and exports. For the purpose of defining an SSI unit in India, the original purchase value of plant and machinery installed in a unit has been adopted as the sole criterion. The ceiling on investment in plant and machinery has undergone periodical change since the introduction of this concept. For a unit to be considered as SSI unit, the current ceiling on investment in plant and machinery is Rs.10 million. For a tiny unit, the said ceiling is Rs.2.5 million. In some select sub-sectors of the SSI sector, the upper limit of investment in plant and machinery has been enhanced to Rs.50 million. The SSI sector including tiny units comprises the domain of SIDBI’s business. Besides, the projects in the services sector with total project cost upto Rs.250 million are also eligible for availing assistance from SIDBI.

The Bank also finances unit in the Medium scale sector (investment in productive plant and machinery Rs 1000 lakh) and industrial infrastructure projects for the development of SSI sector.

Board of Directors

SIDBI is managed by a Board of Directors consisting of representatives from Govt. Of India, Banks, Institutions, Small scale sector and Independent directors.

Channels of Assistance

SIDBI’s financial assistance to small scale sector have three major dimensions

(i) Indirect assistance to small units through primary lending institutions (PLIs)
(ii) Direct assistance to small units
(iii) Development and Support Services
Indirect Assistance

SIDBI’s schemes of indirect assistance envisage credit to SSIs through a large network of 913 PLIs spread across the country with a branch network of over 65000. The assistance is provided by way of refinance, bills rediscounting and resource support in the form of short term loans / line of credit in lieu of refinance, etc.

Direct Assistance

The objective behind SIDBI’s direct assistance schemes has been to supplement the efforts of PLIs by identifying the gaps in the existing credit delivery mechanism for Small Scale Industries. Direct assistance is provided through SIDBI’s 43 Branch offices spread across the country under several tailor-made schemes.

Assistance is Provided Directly for

- Setting up of new SSI units, small hotels, hospitals / nursing homes
- Technology upgradation and modernisation, expansion, diversification
- Quality upgradation/ acquiring of ISO 9000 series certification
- Marketing of SSI products
- Setting up of multiplexes, cinema theaters
- Development of Infrastructure for SSI sector
- International finance, Pre-shipment and Post-shipment Credit
- Discounting of bills of manufacturer-seller in the SSI sector selling either equipments or components
- Factoring services.

SME Fund of Rs. 10,000 Crore

One of the important initiatives implemented by the Bank during the year was operationalising SME Fund of Rs. 10,000 crore earlier announced by the Government. Under the Fund, direct assistance is being provided to SMEs at an interest rate of two percent below SIDBI’s PLR.

SME Growth Fund of Rs. 500 Crore

In deference to the announcement made by the Hon’ble Finance Minister in the Union Budget, with a view to meeting the needs of risk capital for SMEs, SIDBI, in association with select public sector banks, set up a national level venture capital fund of Rs. 500 crore during the year. The Fund, named as SME Growth Fund,

WB Project on Financing & Development of SMEs

For upscaling the availability of capital to SMEs and support the demand side of the credit, SIDBI signed an MOU with the World Bank for a Line of Credit of US$ 120 million for financing and developing of SMEs in India.

Small Enterprises Financial Centres

The RBI Annual Statement on Monetary Policy 2005-06 embodies significant initiatives encouraging banks to establish a mechanism for better co-ordination between their branches and SIDBI. The statement envisaged a scheme of strategic alliance covering gamut of issues relating to rechristenising SIDBI’s branches as ‘Small Enterprises Financial Centres’ and their taking up of co-financing with banks’ branches.
Strategic Alliance with Banks

In the backdrop of the RBI policy announcement and to give effect to the SEFC Scheme, SIDBI has worked out a mechanism for strategic alliance with banks.

Credit Rating Agency for SME Sector

With a view to providing comfort to the bank officials in their credit decisions and helping SMEs gain expeditious access to credit, SIDBI, in association with select public sector banks, and CIBIL has set up SMERA.

Focus on Cluster Development

SIDBI’s cluster approach has been primarily aimed at technology upgradation, entrepreneurship development and environment management, etc. In fact, a few clusters are intended to be developed as “knowledge hubs” and under the World Bank-led multiagency Project on Financing and Development of SMEs,

Development and Support Services

The Bank extends development and support services in the form of loans and grants to different agencies working for the promotion and development of SSIs and tiny industries. Over the years, the initiatives of SIDBI under promotional and developmental activities have crystallised into the following important areas
- Enterprise Promotion with emphasis on Rural Industrialisation
- Human Resource Development in SSI sector
- Technology Upgradation
- Quality and Environment Management
- Marketing Promotion, and
- Information Dissemination

Enterprise Promotion is Supported Through

Micro Credit Scheme

Realising the potential of micro finance in stimulating economic growth and also to serve its mandate for promoting, financing and developing small and micro enterprises in India, SIDBI formulated and launched Micro Credit Scheme (MCS) during 1994. Encouraged with the success of pilot phase of MCS, the Bank launched its new initiative namely, SIDBI Foundation for Micro Credit (SFMC) during January 1999. SFMC’s mission is to create a national network of strong, viable and sustainable Micro Finance Institutions (MFIs) from the informal and formal financial sector to provide micro finance services to the poor, especially women. The efforts made by SFMC have resulted in significant growth of the micro finance sector, wherein MFIs are evolving towards more formal, regulated and sustainable entities. SFMC has also helped in the development of a wide range of service providers viz. training institutions, management institutes, rating services, consultants, software service providers, market researchers, etc. Further, the demonstration effect of the Bank’s micro finance initiatives has lead to the public and private sector banks initiating MFI lending thereby broadbasing their funding sources. Thus, these initiatives have helped in mainstreaming the micro credit programme and also led to the emergence of some large, well established and profitable MFIs in the country.
The foundation is collaborating with International Fund for Agriculture Development (IFAD), Rome for soft loan assistance for providing micro credit to poor, especially in rural areas. SFMC is collaborating with Department for International Development (DFID), UK for grant support for financing various capacity building programmes initiated by Foundation.

Human Resources Development of the SSIs is Persuaded Through

- Small Industries Management Programme (SIMAP), and
- Skill-cum-Technology Upgradation Programme (STUP)

Management deficiency and low level of skill and technology have been identified as major weaknesses of small industries in India. Accordingly, SIDBI has devised SIMAP and STUP, tailor-made programmes for the SSI sector.

Programmes for Technology Upgradation Include

- Technology upgradation in identified industry clusters
- Technology transfer
- Quality improvement

Quality and Environment Management Programmes Aim at

- Making the SSI units aware of the importance of environmental issues and providing them with necessary technical support to implement projects which can provide relative social and environmental benefit as compared to financial cost incurred, and
- Educating the SSI units about environmental regulations, which need to be adhered to and the steps required to operate within prescribed norms.

Marketing Promotion Initiatives Include

- Sponsoring/organising exhibitions in India and abroad with intention of subsidising participation costs for SSIs,
- Tying up with renowned organisations to provide market information to SSIs and their clients, and
- Sponsoring market studies.

Information Dissemination Initiatives Include

- Promoting new units by identification and publicity of viable project ideas and business opportunities through project profiles, Udyog Sadhana Radio Programme.
- Publication of theme based Reports for SSI Sector.
- Product specific sectoral studies to assess the impact of policy changes.
- WTO impact studies.
- Support for compilation and dissemination of details about SSIs.
Role of NABARD in Promoting Dairy and Food Processing Industry and Entrepreneurship

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Introduction

India is the world’s second largest food producer and has the potential to be the world’s number one. The country is a major producer of milk, pulses, tea, fruits and vegetables, spice, wheat, rice, groundnut, sugarcane, eggs and fish. But our share in world food trade is < 1.5%. Only 2% of the produce is processed and post-harvest losses are more than 30%. The value addition to food is only 7% at present as compared to 23% in China, 45% in Philippines and 188% in UK. Food production and processing account for 26% of India’s GDP and for more than 60% of employment. The development that takes place in the food chain will inevitably have high impact throughout the economy. In the context of the Agreement on Agriculture (AoA) under the WTO, good potential exists for promoting and developing the food processing industry in the country. Taking advantage of globalization and liberalization, our processed food exports consisting of processed fruits and vegetables, animal products, other processed foods and marine products have increased from Rs. 8489 crore in 1999-2K to Rs. 11608 crore in 2002-03 i.e. an increase of 37%. The size of the Indian food market at present is estimated to be of the order of Rs.500000 crore, of which the share of value added products is likely to be 45% (Rs.225000 crore). India is competitive in processed foods. In next 10 years GoI has a plan to increase value addition from 7 to 35%, processing level from 2% to 10% with an additional investment of Rs.140000 crore. This increase in food processing level is expected to create 30 million jobs. According to the National Council of Applied Economic Research (NCAER), the investment made in food processing sector during IX plan period (1997-98 to 2001-02) is estimated as Rs.38531 crore. An investment of Rs. 62105 crore is projected during the X plan period at GDP growth of 6% and the investment projection is likely to go up to Rs.92208 crore at 8% GDP growth rate. Hence the availability of adequate credit from financial institutions for investment in food production, processing and post harvest management assumes critical importance. As food-processing sector generates large employment in rural areas, it receives maximum thrust both from Government and financial institutions.

The major constraints in development of food processing sector are lack of awareness about quality standards to be adhered to at all stages of production, high wastage due to lack of infrastructure, large number of players in unorganized sector, existence of multiple food laws and its poor administration. To exploit the opportunities, thrown open to our food industry because of globalisation in post WTO era, not only price competitiveness but also quality encompassing safety, hygiene, reliability, wholesomeness and acceptance by the consumers is important. To produce a safe food, which is competitive in the international market, the indiscriminate use of pesticides and chemicals resulting in harmful residues, poor floor operations with respect to hygiene and sanitation are to be avoided. Agreement on Sanitary and Phyto sanitary (SPS) measures and Technical Barriers to Trade (TBT) under WTO specifies measures to protect human, animal or plant life or health. Harmonization of national standards with international standards like Codex Alimentarius Commission (CAC) and OIE standards is insisted in the post WTO era. Codex standards for additives and contaminants (Aflatoxin, heavy metals, pesticide residue, veterinary drugs residue, micro biological toxins) have to be adhered by countries exporting food products. CAC guidelines
recommend use of safety and quality management system and Hazard Analysis Critical Control Point (HACCP). In the past our peanut exports were affected by different testing procedures and conformity assessment standards followed in different markets. Our country could not exploit the export market available for mangoes in USA and Japan because of pesticide residue. Our egg and egg powder exports also faced problem because of high pesticide residues. The above examples point to the fact that our food industry needs to pay more attention in the coming years to quality and food safety aspects.

Punjab and Haryana are major producers of wheat, rice, milk, eggs, broilers, fruits, vegetables, honey and mushroom. Milk production in Punjab is 8.4 million tons and that of Haryana is 5.2 million tons. Though considerable infrastructure for processing is in place, the capacity utilization of this infrastructure is still not optimum. Further, there is scope to create additional capacities for processing both in private and public sector in these states.

GoI has announced 3 Agri-export zones (AEZs) in Punjab viz. Potato (Patiala, Bhatinda, Jalandhar, Ludhiana), Vegetables (Fatehgarh sahib, Sangrur, Patiala , Ropar) and Basmati Rice (Gurdaspur, Hoshiarpur, Jalandhar, Kapurthala, Nawanshahar). MARKFED and Punjab Agro Industries Corporation (PAIC) are nodal agencies for AEZs. These agencies have definite plans to strengthen processing infrastructure in AEZ areas and promote contract farming.

Institutional finance

Credit is an important input for development of the food industry, whether it is for production or for processing and marketing. Hence financial institutions have an important role to play in exploiting the potential available in this sector along with Government and farmers / entrepreneurs. Banks are providing crop loans for taking up cultivation of various food crops, term loans for investments in plantation crops, dairy, poultry, fish and sheep / goat production, post harvest technology, processing and marketing and working capital for various processing units. Besides, banks provide credit for line of activities and investments in food chain with the objective of ensuring quality till it reaches consumer and stipulate adherence to all national and international quality standards as one of the conditions while apprising and sanctioning Export Oriented Units in food industry. The gross bank credit (outstanding on last reporting Friday of March 2004) for the agro processing sector including food processing is Rs.21567 crore. This is projected to be Rs.42120 crore by the terminal year of X plan. The long term credit requirement of agro processing industry during x plan period is estimated to be Rs.28450 crore in the coming years with the expected increase in value addition there will be more credit opportunities for banks. In case of primary food processing and vegetable oil processing, the credit potential is expected to grow because of focus of the Government to increase pulses and oilseeds production. As promoting direct linkage between industry and farmers through contract farming can better ensure quality raw material for processing industry, there are opportunities for banks to lend to farmers, processors, exporters under contract farming. Already such lending is taking place in a small way under contract farming for
vegetables, basmati rice and broilers. Banks are also financing Self Help Groups to take up low level food processing like pickle making, indigenous milk products manufacturing etc. Banks also provide various credit facilities to exporters of food products.

Role of NABARD in Promotion of Dairy and Food Processing Industry

Developmental & credit role

National Bank for Agriculture and Rural Development (NABARD), as an apex institution in the field of agriculture and rural credit provides refinance support to banks for their lending to food production and processing. As part of its development role, National Bank conducts seminars/training programmes for capacity building of officers of financial institutions, conduct studies and support research projects of relevance from its R & D fund. In order to provide close linkages between food production and processing, the policy thrust of the National Bank is on financing integrated projects of food processing that support post harvest management and aim at technology upgradation. NABARD has also taken several initiatives like encouraging investments in areas like organic farming, contract farming, milk / egg / meat processing, modernization of slaughter house, cold storage and rural godowns. The refinance disbursed by NABARD for the agro processing sector including food processing in 2004-05 was Rs.33.77 crore. Out of this, Rs.2.7 crore was disbursed in Punjab and Rs.0.17 crore in Haryana. For promoting agri exports, NABARD has extended 100% refinance for all activities under notified AEZs on softer interest rates and for contract farming arrangements. The cumulative refinance disbursement by NABARD for AEZ from 2002-03 to 2004-05 stands at Rs.825.69 crore. Out of this, the share of Punjab is Rs.123.03 crore. A working group has been constituted to undertake identification of potential food processing activities, preparation of project reports, identification of credit worthy borrowers, creation of awareness about potential activities among entrepreneurs, preparation of area specific investment plans etc. Besides, National Bank has conducted a number of region and sector specific studies with a view to estimating the potential and preparing an integrated credit plan for development of this sector. Based on such studies, model project profiles were prepared and circulated to banks. Recently, NABARD has released 3 CDs containing 143 model bankable agricultural projects for the benefit of farmers and banks. NABARD has facilitated linking of 16.184 lakh SHGs covering 242.5 lakh poor households in the country with banks upto 2004-05. Some of these SHGs have taken up food processing activities like pickles making, papad making, etc., for income generation. In national consultations organized by Ministry of Food Processing Industries (MoFPI) to firm up the draft National Food Processing Policy – 2005 and the vision document, NABARD has participated. The sub-group on investment credit and marketing support set up by MoFPI was chaired by NABARD. Under its direct financing window, viz. Co-financing, the bank has sanctioned 10 projects related to gherkins processing, milk processing, organic farming, bio-fuel production, embryo transfer technology etc., with a total financial outlay of Rs.72.43 crore jointly with banks. Recently, a potato processing unit with a capacity of 6000 tons / annum, an outlay of Rs. 37.5 crore and a term loan of Rs.18.5 crore has been sanctioned by NABARD for co-financing with State Bank of India and Indian Overseas Bank for implementation in Punjab.

Implementation of GOI Schemes

NABARD is implementing 8 GoI schemes for providing subsidy / assistance to farmers / entrepreneurs, which are credit linked. Out of this, 6 schemes are of relevance to food processing, details of which are given below.

Venture capital fund for Dairy/ Poultry: NABARD is implementing a GoI scheme viz. Venture capital fund for Dairy/ Poultry, under which 50% of the total project cost is provided
as interest free loan to farmers / entrepreneurs from the revolving fund maintained by NABARD. Moreover, timely repayments will enable entrepreneur to get 50% interest subsidy in the interest bearing bank loan. Important activities covered under this scheme are establishment of small dairy units (upto 10 milch animals) with modern equipment (Rs.3 lakh) in non “Operation Flood” districts, purchase of milking machines/ milk testers/ bulk cooling units (Rs.15 lakh), milk processing equipment for manufacture of milk products (Rs.10 lakh), dairy product transportation facilities and cold chain (Rs.20 lakh), cold storage facilities for milk and products (Rs.25 lakh) and private veterinary clinics (Rs.2 lakh for mobile and Rs.1.5 lakh for stationary), poultry breeding farms with low input technology birds (Rs.30 lakh), central grower units (Rs.20 lakh), poultry feed godown, feed mixing unit, analytical laboratory (Rs.16 lakh), egg grading, packing and storing facility for export (Rs.80 lakh), marketing of poultry products (Rs.25 lakh), retail poultry dressing unit (Rs.5 lakh) and egg / broiler carts for sale of poultry products (Rs.0.10 lakh). In Punjab already one central grower unit with an outlay of Rs.15.56 lakh has received assistance under the scheme.

Development/Strengthening of Agricultural Marketing infrastructure, grading and standardization. This scheme aims at promotion and setting up of infrastructure related to marketing of agriculture and allied sector products. Under the scheme, 25% of the capital cost with an upper ceiling of Rs.50 lakh on each project is being provided as back ended subsidy. The subsidy is 33.33% of the capital cost subject to ceiling of Rs.60 lakh in case of SC/ST entrepreneurs, NE States, hilly and tribal areas. There is no limit for subsidy for state government agencies. The scheme is reform linked i.e. it requires amendment of APMC act to allow direct marketing, contract farming and permit agri produce markets in private sector and cooperatives. Further, there should be no change in the form of the basic produce. The scheme was announced on 20 October 2004 and will be in operation during X plan. Punjab is one of the few states to amend the APMC act. As a result, already 7 units with a total financial outlay of Rs.93.46 lakh have been assisted under this scheme.

Capital Investment Subsidy Scheme for construction / renovation / modernization of Cold Storage and storages for horticulture produce. The objective of the scheme is to reduce post harvest losses, avoid distress sales by farmers due to perishable nature of agricultural products and get remunerative prices for the products. 25% of the project cost subject to maximum of Rs.50 lakh is provided as subsidy under the scheme. The subsidy is 33.33% of the project cost subject to ceiling of Rs.60 lakh in case of SC/ST entrepreneurs, NE States, hilly and tribal areas. Under this scheme already 1116 projects with a financial outlay of Rs.1338 crore and bank loan of Rs.703 crore have been sanctioned and a refinance of Rs.282.71 crore was disbursed upto 2004-05. In Punjab 66 cold storages with a total capacity of 1.86 lakh tons, financial outlay of Rs.59.83 crore and bank loan of Rs.31.27 crore have been sanctioned under the scheme. In Haryana 26 cold storages with a total capacity of 0.83 lakh tons, financial outlay of Rs.32.5 crore and bank loan of Rs.19 crore have been sanctioned under the scheme.

Capital Investment subsidy scheme (CISS) for rural godowns

The major objective of the scheme is to prevent distress sale immediately after harvest, promotion of pledge financing and marketing credit and strengthen agricultural marketing infrastructure in the country for the introduction of a national system of warehouse receipts. Maximum ceiling of subsidy in each project will be 25% of the project cost or Rs.37.5 lakh, whichever is lower in general cases and 33.33% of the capital cost subject to a ceiling of Rs.50 lakh for SC/ST entrepreneurs, NE states, hilly and tribal areas. Under this scheme already 7108 projects with a financial outlay of Rs.1709 crore and bank loan of Rs.1111
crore have been sanctioned and a refinace of Rs. 372.96 crore was disbursed upto 2004-05.
In Punjab, so far 2952 rural godowns with a total capacity of 31.46 lakh tons, financial outlay of Rs. 348.16 crore and bank loan of Rs.237.18 crore have been sanctioned under the scheme.
In Haryana 165 rural godowns with a total capacity of 11.84 lakh tons, financial outlay of Rs.133.7 crore and bank loan of Rs.92.04 crore have been sanctioned under the scheme.

Credit Linked Capital Subsidy Scheme for Technology Upgradation of SSI Units

The objective is to facilitate technology upgradation of SSI units in the specified product/sub-sectors through provision of 15% capital subsidy on purchase price of plant and machinery (maximum Rs.15 lakh) for induction of well established and improved technologies. The activities covered under food processing in the scheme are pickles, sauces & chutney manufacture, spice grinding, bakery products, cashew processing, rice milling and ice-cream manufacture. Besides cattle feed industry is also eligible for assistance under the scheme.

CISS for commercial production units of organic inputs under National Project on Organic farming. The objective of the scheme is to promote organic farming in the country and compete globally. Under this scheme, 25% of the project cost is available as subsidy for biofertilizer unit (maximum Rs.20 lakh), fruit and vegetable waste compost production units (maximum Rs.40 lakh) and vermiculture hatcheries (maximum Rs.1.5 lakh). In Punjab, already 2 vermiculture hatchery units have been sanctioned under this scheme.

Entrepreneurship development

For entrepreneurship development in various farm and non-farm activities including food processing, NABARD is implementing the following programmes. Rural Entrepreneurship Development Programme (REDP). It is a promotional programme and capacity building measure for rural unemployed youths to enable them to set up their own enterprises. NABARD provides promotional assistance to capable agencies (NGOs, Development Agencies, Technical Institutes etc). So far, NABARD has conducted 6247 REDPs covering 1.72 lakh persons and involving Rs.27.02 crore grant assistance. This has enabled 56758 persons to establish enterprises in rural areas till 31 March 2004. To ensure greater impact, the programme has been institutionalised by associating Rural Development and Self Employment Training Institutes (RUDSETIs) and banks in conducting training programmes. A few commercial banks viz. Andhra Bank, Bank of Baroda, Punjab National Bank, SBI, Syndicate Bank, Bank of India, Canara bank, Corporation bank, etc., have set up training centres either on their own or in collaboration with reputed trusts for providing training in entrepreneurship development. NABARD has been actively involved with these institutes, sharing both training and operational expenditure and is also associated with a few RRBs in conducting REDPs. Recently NABARD also initiated REDPs for ex-servicemen. In Punjab, 29 REDPs for training 544 persons and in Haryana 21 REDPs for training 500 persons have been sanctioned during 2004-05. A few of them are for food Processing including mushroom processing, pickles making, etc.

Development of Women through Area Programme (DEWTA): Under this, women specific activities and clusters are promoted with the objective of generating employment through entrepreneurship and assisting in setting up of sustainable enterprises. So far, three RRBs have been sanctioned Rs.31.98 lakh for addressing training/skill upgradation and other capacity building needs of 3271 women over a period of 3 years.

Assistance to Rural Women in Non-Farm Development (ARWIND): This scheme was specifically designed to meet both promotional and credit needs of women entrepreneurs supported by NGOs/VAs, Cooperatives and other registered institutions. 133 projects covering 9973 women entrepreneurs and involving grant assistance of Rs.302 lakh have been sanctioned upto 2004-05 under this scheme.
Micro-enterprise Promotion by SHGs

NABARD has initiated a pilot project in 10 select districts, wherein identified resource NGOs will act as Micro-Enterprise Promotion Agencies (MEPA) and assist capable SHG members take up income generating activities on a sustainable basis.

Agri-Clinics & Agri Business Centre (ACABC):

With the objective of reaching quality extension services to the farmers on commercial basis through private initiatives and self-employment opportunities to graduates of agriculture and allied disciplines, the National Bank has formulated agri-clinics and agri-business centres scheme and circulated to banks. Under this scheme, professionals in agriculture and allied sector can be assisted for setting up agriclinics/private veterinary clinics with soil testing/quality control/feed analytical/disease diagnostic and other laboratories depending on the viability by banks. NABARD is extending certain concessions like 100% refinance, concessional interest rate etc. to banks for their lending under agri-clinics and agri-business centres scheme and AEZ. It also provides interest free soft loan assistance (service charges will be levied by banks) for meeting part of margin money requirements by entrepreneurs establishing agriclinics, hi-tech projects and export oriented units. So far 782 units with a bank loan of Rs. 23.99 crore have been established under the scheme. The achievements under the scheme in Haryana and Punjab so far are 103 and 9 respectively.

Rural Infrastructure Development

From Rural Infrastructure Development Fund (RIDF), National Bank is providing financial support to State Governments for strengthening rural infrastructure. So far, 2.16 lakh projects (irrigation, rural bridges, rural roads, rural drinking water, mini hydel projects, soil and moisture conservation, etc. projects) with a financial outlay of Rs.42948 crore have been sanctioned under RIDF (I to X). The different activities related to dairy and food processing that can be covered under this fund are setting up of food Parks, investments under Agri Export Zones, setting up of market yards, modern abattoirs, quality control Labs, cargo Complex etc. NABARD has sanctioned three food park project proposals for assistance under RIDF in the country.

NABARD Consultancy Services (NABCONS)

NABARD has floated a wholly owned subsidiary known as ‘NABCONS’, which provides consultancy services in field of agriculture, rural development and allied activities. NABCONS has contracted 168 assignments upto 2004-05 involving a total consultancy fee of Rs.15.18 crore. The NABCONS is actively involved in preparation of detailed project reports, techno economic feasibility reports, conducting evaluation studies in dairy and food processing sector. Recently NABCONS cell of Punjab and Haryana Regional office has prepared 3 project reports for establishment of food park and mushroom processing.

Future Challenges

In the coming years, food production and processing will be more market driven and technology driven. With the opening up of global markets, more thrust will be given for export driven production. Food safety and quality will receive more and more attention in all levels, starting from the small scale producer to consumer, not only to cater to the export market but also to domestic market. If quality and safe food fetches a premium price, more and more entrepreneurs may go for installing quality assurance systems and technology upgradation which in turn requires financial support from banks. Hence there is need for creation of awareness about quality and food safety not only among producers, processors
and consumers, but also among other players in the food chain including bankers. This only will help in modernization of food chain with active credit support from banks, which is a must for reduction of loss and wastage, improving quality and exploitation of export potential. Government should also improve the enforcement of rules under Prevention of Food Adulteration (PFA) act, besides encouraging safe and quality food production with required financial support. Government is already in the process of drafting “Integrated food law”, which is essential to meet the dynamic requirements of international trade and Indian food trade and industry. Ensuring better linkage between food processing industry and food producers through contract farming, packaging according to consumer preference and demand, brand building, market intelligence and trends, market development and research for evolving cost effective technology are other challenges, which have to be tackled for ensuring continuous growth of the industry. Entrepreneurship development in dairy and food processing industry involving unemployed youth, farmers, SHGs, cooperatives, etc. in villages besides promoting large size export oriented food processors and ensuring quality adherence is a major challenge. This can be tackled only with active participation and cooperation of all players.

**Conclusion**

Dairy and food processing industry have immense potential to generate employment in rural areas. To exploit this potential and succeed in global markets, quality and cost are two important challenges. For enabling our food industry to face these challenges, banks have a significant role to play in the coming years along with other Government and research agencies. Hence, there is need for forging new partnership between food producers, industry, Government, Research institutions and financial institutions for development of food processing sector.
Entrepreneurship as Critical Input for Dairy Development
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Introduction

Human resources are one of the most strategic and critical determinants of growth. In spite of abundant physical resources, a country cannot make rapid economic and social advancement unless it has enterprising people with necessary knowledge, skills and attitudes. So, it is the supply of people with entrepreneurial thirst that makes nation to march ahead in the process of development. Given the natural endowment of resources the fact that development or under-development of any nation is largely the reflection of the abundance or scarcity of entrepreneurship. Development of entrepreneurship is crucial in harnessing vast untapped human resources of a country like India and this also hold true in the field of dairy where available potential is still to be realised. Several research findings do suggest that entrepreneurship is the dominant variable in the growth process of any society, community or a nation as a whole. Entrepreneurship development among rural people is increasingly being recognized as a means to overall development of the rural community. The problem posing to our rural masses is not so much in terms of creation of productivity and wealth as that of developing the capacities and ensuring utilization of human potential in creating wealth. Motivating the rural folk towards entrepreneurship in the area of agriculture and dairying would go a long way in mitigating their problems of unemployment and poverty.

Why to promote Entrepreneurship in Dairying?

It will not be less than correct to mention that entrepreneurship has become the buzzword of the day. Entrepreneurship has now become most important phenomenon for rapid progress in dairy. Today when there is growing concern for greater attention to our rural economy, the dairy sector offers big opportunity to transform our economy by bringing prosperity to the rural sector. The supporting income from animal husbandry and dairying is farmer’s cash insurance against any distress caused by the crop failures. In our country 26 crore people still live below the poverty line. The dairy sector provides immense opportunities for eradicating poverty. While delivering inaugural address at XXXIII Dairy Industry Conference at New Delhi on September 26, 2004, Shri Bhairon Singh Shekhawat, His Excellency, the Vice President of Indian mentioned “there is need to make dairy development an area of core competence in the national programme of poverty reduction and rural prosperity”.

The fact that dairying could play a more constructive role in promoting rural welfare and reducing poverty by generating employment at farm level is increasingly being recognized. Despite this upside fact about dairying, this sector in India has not picked up on commercial line. Tenth Plan proposal of Govt. of India, truly mention that animal husbandry and dairying will receive a high priority in the effort for generating income and employment, increasing animal protein availability in the food basket and for generating exportable surplus. A sustainable and financially viable dairy farming, which will generate income and self-employment through entrepreneurship, is need of the day. Market oriented milk production will be key livestock activities to generate income on a steady daily basis for resource poor households. In this context entrepreneur is one of the most important inputs for development of dairying, which may prove phenomenal for economic development of a country or of regions within the country.
Factors in Dairy Entrepreneurship

Although, entrepreneurship is a function of several factors, out of those, three sets of factors could be identified, which mainly influence entrepreneurship. These are: i) The individual or Entrepreneur; ii) socio-cultural factors; and iii) support system.

The Individual

The individual constitutes the most important element in entrepreneurship. The entrepreneur as an individual takes the decision to start or not start dairy as an enterprise. And it is who strives to make it success. Again, three main factors, which influence the individual behaviour are his/her motivational factors, factors concerning various skills that entrepreneur possess, and the factors relating to his knowledge of several relevant aspects that are likely to contribute to success of the entrepreneurial roles. The motivational factors i.e. inner urge of the individual to do something new in a particular field has been found very important. To be successful an entrepreneur needs several kinds of skills; project development skill, enterprise management skill and enterprise building skill. At the same time, an entrepreneur needs to have knowledge about several areas of activity relevant to his domain in dairy enterprise. Knowledge about economic-political environment, financial institution, availability of inputs, technology, development agencies etc. Such knowledge helps him plan his strategy and use skills effectively.

Socio-Cultural Factors

Family background, norms and values of the immediate social circle contribute substantially to entrepreneurship development in dairying. The values and attitude an individual has, are a function of the socio-cultural millieu. Behaviors which reflect inclinations towards initiative and risk taking, dependence or independence, working with one’s own hands on tasks requiring manual handling etc. are a result of the socialization process in the family, the school and society. Behaviour rewarded through appreciation, encouragement, and other extrinsic as well as intrinsic devices gets reinforced and related values and norms develop.

Support System

Possibility of the success of dairypreneur generally gets enhanced by efficient and effective operation of the support systems. In an empirical study conducted by authors several organizational and institutional support systems were identified and analyzed by executing PRA techniques. The list of support systems include family, relatives, commercial bank, cooperative bank, cooperative society, input agencies, animal husbandry and dairy development department, research institute, KVK, veterinary hospital, stockman centre, friends, private money lender, local milk market and local dairy unit. Being ultimate destination in marketing of produced milk and major source of monetary receipts, milk marketing agencies, which includes dairy cooperative societies, local milk vendor, local milk market etc. were perceived as most important by the dairy entrepreneurs. Input agencies also played important role in supplying and making available all technical inputs in time to the entrepreneurs, and were perceived next important support system. Cooperatives were ranked third with regard to its perceived level of importance in entrepreneurship. The social image and multidimensional role played by cooperatives labeled it as one of the important institution. However the importance of government development departments in the area of animal husbandry and dairying was also recognized to some extent, as these organizations were assumed responsible for implementing various development programmes for developing dairy entrepreneurship. Other agencies such as bank, friends/relatives and private
moneylenders were making their presence realized by entrepreneurs but degree of importance was rated low.

In the process of entrepreneurship, it is equally important to know that what level of support these support agencies actually extend to the entrepreneurs. Because level of support extended by them are tangible help received by entrepreneurs. As evident from Figure 1, the cooperatives were extending most tangible support to the entrepreneurs by extending help of multifarious nature. Next comes, input agencies, which support the farmers in running dairy enterprise by supplying important inputs in time. It was quite discouraging to note that government development departments were ranked last on the basis of level of support received and perceived by the entrepreneurs. The general belief of inefficient working of government departments holds true here with great dissatisfaction of entrepreneurs with the kind of support extended by these organizations. Government organization must improve their performance to match their extended level of support with expected degree of importance by the entrepreneurs.

**Conclusion**

The observation discussed in this paper highlighted certain manipulable variables or factors, which must be considered while conceiving, plan for promoting entrepreneurship among milk producers. The social institutions like cooperatives, milk market agencies, and input agencies are supporting dairy entrepreneurs to a great extent, but govt. organizations like AH and dairying development departments, VH, SMC etc. are lagging behind in extending support. There is urgent need to improve functioning of these organizations in the efforts for promoting entrepreneurship among dairy entrepreneurs.

Circle size is directly proportional to Degree of importance
Length of line is inversely proportional to level of support

![Figure 1: Importance and level of support perceived by dairy entrepreneurs](image-url)
Organic Dairy & Foods Enterpreneurship and Alternatives

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Traditionally, Indians love “Nature” and every component of our civilization, style of living endeavours to bring us near to the nature. To elucidate in our music we have ragas for each season. With growth in population every thing changed. Pressure on cultivated land increased and food production system became intensively input oriented with increasing use of chemical fertilizers, pesticides, and lately use of genetically modified food items. However, now with rising disposable income, effective mass communication, growing awareness about health environmental and food safety, is picking up which has pushed the community to use costlier organic foods including organic milk.

Definition and Origin

Organic milk means the milk derived from organic disease-free animals, reared under natural conditions on pesticide-free feed and toddler produced organically on natural fertility of soil, treated by herbal or homeopathic medicines. According to Dr. T. Nissen of “The Organic Service Centre Denmark”, organic farming in real term is biodynamic farming which was founded by philosopher Rudolf Striver in Germany in 1924. Organic movement, in real effective way got started in 60s based on experience of biodynamic farming. In 1981, organic farmers coordinated internationally and established the International Federation of Organic Agriculture Movements (IFOAM) (Banerjee, 2001)

The philosophy of organic farming emphasizes the need to produce food or milk in an, “integrated, humane, environmentally and economically sustainable agricultural production system” (Sem. 2002). Organic products have characteristics which differentiate them from conventional farm produces, viz.:

1. Integrated animal & crop production.
2. Safer products devoid of chemical residences of pesticides, antibiotics, etc.
4. Higher quality and appearance, and
5. Environment friendly.

Organic production systems, unlike traditional systems of production, are governed by a set of standards, (organid standards) to be followed strictly by producers of organic foods. Compliance of these standards is verified by certification agencies authorized by the respective governments. Organic certification guarantees not only the quality of product but also the quality of production method or system. This more than appeals to the consumer. In the conventional products, there is no way to guarantee the production procedure.

Requirements or Standard for Organic Livestock Production

Standards for organic livestock keeping are meant to assure both an organic product to the consumer and living conditions for the animals which limit stress and promote good health. These address substances used in health care and feeding and herd management and housing.
Animal Management

Must fulfill the basic behavioral needs health and welfare of the livestock. Livestock farming cannot be done in isolation from crop farming. Ample provision should be made for free movement, open fresh air, water, feed and grazing opportunities for the animals.

Conversion Period

The time between the start of organic management and certification of animals is known as the conversion period, which is fixed as 12 months for dairy animals.

Brought in Animals

Animals should be born and raised on organic holding and not on conventional holdings. Brought-in-conventional animals are allowed when organic livestock is not available. When organic livestock is not available, For this situation, calves up to 4-weeks-old that have received colostrum and are fed a diet consisting mainly of full milk. Time limit for certification of these animals is 5 years and yearly 10 percent of the animals of the same species can be replaced.

Breeds and Breeding

Breeds which remain well adapted to local conditions should be selected. Breeding should be natural. Artificial insemination not allowed unless it is a veterinary necessity.

Mutilations

Mutilations are not permitted. Following exceptions are, however, allowed viz, castration, dethroning, ringing in dairy animals and should be done with minimum suffering to the animal.

Animal Nutrition

Dairy stock should receive 100% organically grown feeds of good quality from the farm itself. Force feeding is forbidden. In a situation, when it proves impossible to obtain feeds from organic farming the accredited certification programme may allow 15% of dry matter intake to be procured from conventional sources. Synthetic growth promoters, appetizers, preservatives, all types of excreta feeds supplied to solvent extraction, other chemical agents, pure amino acids, genetically engineered substances are not to be added. Vikamius, trace elements and supplements shall be used from natural origin.

Veterinary Medicines

For preventive health care and treatment only herbal, homeopathic medicines, acupuncture or local techniques should be used. Allopathic medicines are not permitted.

Transport of Animals

Journey time should not exceed 8 hours and ample water and feed should be available during the course.

Record Keeping

Producer should keep written records concerning production and processing. Input used sources of inputs, medicines given, sources of feeds and toddler given and welfare measures taken are to be recorded. Besides, the records should contain (i) Third party certification (ii) Audit trails (iii) annual inspection (iv) material list (iv) conversion periods (vii) sustainable farm plan.
Labour

No child labour to be used in production, processing and marketing of dairy products.

Scope for Organic Milk Production

One can witness people daily going in the morning to nearly Khatals in their localities to fetch milk dram in their presence. They want to ensure that the milk their family consumes is unadulterated and are ready to pay premium price. Right now, they fail to notice what is fed to the animals, under what is conditions the milking of the animal is done and the milk is containing antibioles etc. However awareness is growing; and sooner demand for organic milk will appear as is already there for vegetables, fruits and food products. A ‘swot analyses” can throw better light about the unfolding market for Organic milk.

SWOT Analysis

Strength

Indigenous Cattle and Buffalo Wealth

India is enriched with an enormous bovine population (273.3 million) with 26 native cattle breeds (10% of worlds) all breeds (8 breeds) of riverine buffaloes producing over 84 million tonnes of milk annually making number one milk producer in the globe.

Milk production is predominately the domain of small holding farmer in a mixed farming system of which 70% constitute dry land or rain fed areas. As such use of chemical fertilizer and agrochemical is very low.

Indigenous breeds have unique characteristics like endurance, docility, resistance to tropical diseases, ability, resistance to tropical diseases, ability to utilize coarse fodder and heat tolerance. This is why these have attracted attention of foreign countries particularly south America. Programmes have been taken up to develop these (chander & Kumar 2002) Energy efficiency of desi Cattle is 17% as compared to 4% of American beef breeds (Chander & Kumar Loc. cited). As such these are most suited for organic farming.

Enough dung an important component of organic farming is manuring. Yearly Cattle dung, in India has a fuel value equivalent to 35 million tonnes of coal. An estimated 1/3 of this or 300 million tonnes of drng is used as fuel which can be diverted for manuring if bottled methane gas from bio-gas plants is made available to such families (Anon, 2005)

Expanding Market

With growing awareness for environment, chemical free foods, health and nutrition, market for organic foods is opening up.

Rising Income

Per capita income is continuously showing an upward trend. During 2004-2005, percapita has gone up by 10.7% (Anona 2005) Consequently, the quality consciousness and willingness to pay more for good quality products including organic items would definitely go up in coming years.

Export Potential

The market for organic dairy products in Austria, U.K. and Denmark is annually growing @ 30 per cent whereas in sweden, Germany and France @ 15 per cent. Besides, organic dairy
products are fetching 60% greater price than conventional dairy products (Banerjee, 2001). Organic dairy farming add up greatly to the export item list of Indian dairy products.

**Contract Farming System**

Loud holding are small. With the introduction of contract farming system, this bottle neck can be removed. Larger organic dairy farms will them not remain a distant dream.

Treasure chest of herbal, Ayurvedic & Homeopathic medicines. An important prerequisites for producing organic milk.

**Milks is cost competitive**

Indian milk, cost-wise is quite competitive being stands fourth lowest in the world and fortunately thee are no subsides in the Indian dairy industry (Jain, 2002). This is a great plus point.

**Weakness**

(i) Seventy percent of the milk producers are laudless. Most of them re illiterate. These will be major landscapes for organic farming. Contract farming and present large number of educated unemployed, put together promise a bright ray of hope to face it.

(ii) Lack of training in organic farming. In due course facilities will be created to take care of this.

(iii) Herbal and homeopathic remedies : available at present are of unreliable efficacy.

(iv) Long gestation period required for start ups.

(v) Use a child labour: No child labour is permitted in organic dairy farming. This may be yet a nwre cosntraint for India where children share a lot of work relative to livestock production. As incomes grow in rural areas, this handicap will be nullified.

(vi) Clean drinking water & green fodder: are to be supplied to animals in organic milk production. Both these requirements appear difficult to be met. Adoption of contract organic dairy farming will certainly lrase these limitations. Moreover our breeds have strong survival poential and can maintain them selves on crop residues.

(vii) Shrinking Land and grazing area: Due to population growth land and grazing areas are shrinking due diversion for crop farming. Looking to the potential and to efforts underway to maximize production of food crops, in near future requirement for grazing area certainly can be fulfilled.

**Opportunities**

**High profit margin**

On an average organic milk produces are charging 60 percent higher price than the milk produced by the conventional method. (Banerjee, 2001)

**Export Potential**

Export of livestock products is fast growing. Export of dairy and poultry products during 2004-2005 period recorded 65% increase over the previous year in terms of dollars (Anonb 2005)

**Value Addition and Diversification**

As in the conventional milk production and processing, organic milk processing and manufacturing also offers a great scope in this respect. Add to the equipment line and increase your organic milk product lines. With value addition, profits will move faster.
Threats

Multi

Agencies involvement: For certifications and labelling, organic diary production has to face several agencies. Process becomes slow and the path becomes difficult to tread and tackle.

Lack of Infrastructure and Bureaucratic Slow Action

Formation of committees and agencies for certification and accreditation's are to be formed for different regions and stages by the government. This remains slow and tiring for the organic producer. However, as the things get moving, the process will catch up. Successful implementation and efficient guidelines can remove these constraints.

Looking to the aforesaid ‘SWOT’ analysis, it is not difficult to conclude that ‘strength’ and opportunities for out weight ‘weakness’ and threats. The scope for organic milk industry is great.

Opportunities & Challenges

Haring established the scope of organic dainging in the country let us briefly look to the opportunities it offers:

(a) Opportunities in production of Organic feed & fodder.
(b) Opportunities in raising organic replacement livestocks.
(c) Opportunities cultivation processing of herbal and ayurvedic medicinal plants.
(d) Opportunities in preparation of homeopathic, ayurvedic and herbal medicines for livestock.
   Besides local market big export market is true for these.
(e) Opportunities in processing & production of organic dairy products.
(f) Opportunities in promotion & presentation of organic dairy products.

The only main challenge is how fast and successfully programme for organic milk production is implemented and carried out efficiently.

As such, let us not stand still, but join hands, to work shoulder to shoulder to put India firmly on top of the map of “organic” products.

When Brazil and Argentina can achieve why not we?

We have the resources, what we need is the “Will” to do and we will succeed.

References

Milk Quality Assurance by Self Imposition of Milk Quality & Milk Product Regulations & Improvement by Entrepreneurship

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Present Scenario

Every now and then reports appear in the media about use of so called “Synthetic Milk” to adulterate market milk. Samples of milk taken from vendors, sweetmeat shops and private traders in Hyderabad city were found not to meet the minimum legal standard requirements (Rao et al. 2002). Consumers feel worried about food safety and fear to consume Milk.

Traditionally, it has been the practice of the national governments to assume sole responsibility for regulation of food quality through various food laws, with aim to protect the health of consumers. Our food laws are good but enforcement is poor (shourie, 1998). Primarily, because the existing regulatory systems are based on policing and end-product testing. Instances are not lacking when milk has been found adulterated with vegetable oils, urea, caustic soda, formalin and even palmolein. The laws are quite strong and stringent. Provisions for imposing penalty are adequate and the procedure for trial can be efficacious. But the enforcement is lacking. The trader and vendors feel comfortable and they do not fear. They in fact enjoy a “cosy” relationship with inspectors and also with testing laboratories. Under the conditions, prevailing, the poor and deprived sections of the population who necessarily depend on street milk vendors supplying loose unpacked milk remain the main victims.

Trade liberalization and globlisation present new challenges in respect of ensuring the quality and safety of dairy products for both domestic consumption and export. The Agreement on application of Sanitary and phytosanitary Measures (SPS Agreement) under the WTO regime aims to introduce discipline in the international and domestic food trade and curb the use of unjustified protection measures. Consequently, all member countries are obliged to harmonize their dairy standards / guidelines with that of international rules as framed by the codex Alimentation Commission. The Indian dairy industry is now confronted with the problem how to ensure that the dairy products exported are in compliance with the stringent SPS requirement of that country. Inland consumer have also become conscious of food safety and quality. It is estimated that due to poor milk quality management, milk is wasted to the tune of Rs. 5500 Crores a year (Nanda and Saxena, 2000). Tackling the problem of milk quality therefore needs priority.

Present Regulatory Set up in the Country

Ten ministries and departments are administering the dairy sector. Ministry of Health deals with food safety and quality. Ten legislations in force are:

2. Essential commodities act, 1955, administered by Ministry of consumers affairs by enforcing following orders:
   (iii) Infant milk substitutes Act 1992 & 1993
   (iv) Insecticide act 1968.
   (v) Export Quality control & inspection) Act 1963
(vii) Environment Protection Act 1986
(viii) AGMARK Act 1937, 1986
(ix) Bureau of Indian Standards Act, 1986

Multiplicity of laws & rules in dairy sector leads to lack of implementation and confusion in the minds of manufacturers and traders. These however, are getting merged and integrated.

The advisory and regulatory role of government towards formulation of food standards cannot be questioned. Suggestions can definitely be made.

**Self Imposition of Quality Regulations Sound Alternative Milk Quality Assurance**

In the counting nearly 8520 of the milk produced is handled by people who have no regard for safety and quality. Even the producer at farm level and consumer at some seldom take action to improve on this front. Consumers simply complain or grudge but Considering the colossal, it is not possible for any government to solve the menace of poor quality a adulterated milk. It can be eradicated by self imposition of quality regulations at all levels or stake holders covering producer, dudhia, trader, processor, distributor consumer, sampling agencies and testing laboratories. A movement involving several NOG’s univestities, social organisations to educate milk, hazards for health due to its poor quality, and to clearly convince them not to buy or sell substandard not to buy or sell substandard milk. School children should be informed first to motivate their elders to shun milk of doubtful quality.

To the extent possible, all concerned should be made familiar with HACCP based quality assurance system to follow it in practice as early as possible.

**Set up private laboratory for testing:**

Important component of this programme, is the well equipped reliable laboratories for testing the quality. These should be managed by private organisation.

**Education and Training for Food Safety**

For this details should be worked out by involving competent knowledge people from government and public.

**Set up Volunteer Groups**

Locality wise, region wise Volunteer bodies should be formed to educate and campaign is this in a systematic planned manner. Regular testing and advising the consumer and seller to discouraged transaction of unwholesome milk should be arranged by these groups.

Lastly, arrangement for small scale milk chilling facility on reasonable charge per litre in rural milk producing area if made will go a long way in improving the quality of milk. Time has come to act and not sleep. Similar views have also been expressed by Chawla (2002).

**Reference**


Utilization of Sunflower Kernel in Confectionary-Novel Approach in Food Industry

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Sunflower seeds are the gift of the beautiful sunflower, a plant with rays of petals emanating from its bright yellow, seed-studded center. The sunflower produces grayish-green or black seeds encased in tear-dropped shaped gray or black shells that oftentimes feature black and white stripes. Shelled sunflower seeds have a mild nutty taste and firm, but tender texture. In the health conscious world of today, nutrition helps in selling new food products prepared from novel protein sources and sunflower is one such potential protein supplement for human diet, mainly due to its superior nutritional quality absence of anti-nutritional factor. Sunflower kernel is also a good source of the minerals calcium, phosphorous, magnesium, and iron, and is one of the prime suppliers of B-group vitamins. They can be added to breads and cereals, eaten as a snack, slow-roasted at low heat and sprinkled over salads. They are also used in the preparation of nutritious sauces and mock cheeses, or they can be soaked and blended into nut milks and Soya milk to improve their nutritional value. Popularizing sunflower kernel in the diet can help combating protein-calorie malnourishment in the children to a certain extent. Roasted seeds such as peanuts, almonds, cashew nuts etc are few popular snack foods but are costly; hence a need exists to find out cheaper substitutes. When considered in aggregate, the amazing sunflower kernel adds a nutritional wallop to a wide array of products such as breads, muffins, crackers and snack foods. Therefore, the present work is an attempt to develop shelled sunflower seed as a snack food and to evaluate its quality and acceptability. Such type of products may be good for consumers who are increasingly interested in functional foods. It’s also good news for manufacturers of baked goods and snack foods, because it provides the opportunity to consider kernel as an ingredient in new products in order to deliver upon this growing demand. For this, process and equipments have been evolved for the production of sunflower kernel from seed. The products like roasted sunflower snack food as well as sunflower kernel caramel snack have been prepared and evaluated for their acceptability. The taste of the prepared snack foods was found good. Also, these products appeared to be preferred in textural as well as sensory evaluation.

Introduction

The sunflower seed is more correctly described as acne (intact seed) of the plant Helianthus annus L. It is pointed at the base, rounded at the top, and approximately 10-15 mm long, 4-5 mm wide, 1-2 mm thick. The outer portion of the pericarp or hull consists of elongated and pigmented cells. Immediately below is the testa or seed coat which is a white papery layer (Gupta & Das ,1997). In sunflower, the endosperm is only one or two cells thick. The embryo consists of two cotyledons. The main exception is the higher ash contents which tend to reduce the metabolically energy. The meal is the higher energy product and is an excellent source of water soluble B-complex vitamins. The sunflower seed hull contains lipids and cellulose and lignin as principle constitute; and can be utilized in livestock and poultry feeds. Sunflower Seeds can also be called a “Wonder food.” Each seed is a concentrated powerhouse of essential nutrients and “sun-energy”. Sunflower Seeds have a 50% fat content of which 30% is the essential fatty acid, linoleic acid. The mono-unsaturated fatty acid, oleic acid, accounts for some 10% of the total fat content. The Vitamin E content of Sunflower Seeds is very high - which is Nature’s way of countering free radical production and ensuring that the fats in sunflower seeds do not turn rancid.
The sunflower seed contains protein in the range of 24-27% whereas kernel contains as high as 36% protein and could be used for various protein enriched food products preparation at lower cost. In the health conscious world of today, nutrition helps in selling new food products prepared from novel protein sources and sunflower is one such potential protein supplement for human diet, mainly due to its superior nutritional quality and absence of anti-nutritional factor. Many researchers have also advocated for the incorporation of either defatted flour or roasted sunflower grits as protein enrichment of bakery products.

Sunflower seeds are a good source of the minerals calcium, phosphorous, magnesium, and iron, and are one of the prime suppliers of B-group vitamins, provided they are used in moderation, it is safe to use sunflower seeds on a regular basis. They can be added to breads and cereals, eaten as a snack, slow-roasted at low heat and sprinkled over salads. They are also used in the preparation of nutritious sauces and mock cheeses, or they can be soaked and blended into nut milks and Soya milk to improve their nutritional value.

### Table 1: Nutritional analysis of sunflower seed

<table>
<thead>
<tr>
<th>Test</th>
<th>Per 100g Raw</th>
<th>Per 100g Toasted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kilojoules</td>
<td>2340.8kj</td>
<td>2432.7kj</td>
</tr>
<tr>
<td>Calories</td>
<td>560Kcal</td>
<td>582Kcal</td>
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</tr>
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<tr>
<td>Fat</td>
<td>47.3g</td>
<td>49.8g</td>
</tr>
<tr>
<td>Fiber (Crude)</td>
<td>3.8g</td>
<td>11.1g</td>
</tr>
<tr>
<td>Sodium</td>
<td>2.8mg</td>
<td>3mg</td>
</tr>
</tbody>
</table>

Production of sunflower oil is being practiced in India mostly (about 80%) through solvent extraction and about 20% whole sunflower seed is being crushed in screw expeller leaving around 20% oil in the cake. The presence of fairly high proportion of hull in the sunflower seed (varies between 20 to 30%) not only causes ware of the moving parts of the expeller but reduces the total oil yield showing consumption of high specific energy and yielding cake of no use (Tranchino et.al, 1984). Also, during extraction of oil from sunflower seed either by mechanical expression or through solvent extraction, pigments present in the hull are transferred to the extracted oil resulting dull coloured sunflower oil which is being removed during refining causing increased refining cost. If hull could be removed prior to extraction, refining cost would be lower and good quality oil could be produced at reduced processing cost. Extraction of oil using de-hulled seed may also reduce the volume of solvent being used for extraction of oil. This may benefit oil industry to tune of million of rupees.

The sunflower seed contains protein in the range of 24-27% whereas kernel contains as high as 36% proteins and could be used for various protein enriched food products preparation at lower cost (Earle et.al, 1986; Lanfranco et al, 1989). In USA, 25% sunflower is used in confectionary products in the form of roasted and salted snack foods (Anon, 1991).

Sunflower kernel and its defatted meal have some advantages over other oil seeds meal as human protein food because of their flavor, high digestibility, biological value and absence of anti-nutritional and toxic factor (Clandinin, 1978) In literature it is reported that sunflower kernel is also a good source of vitamin, calcium, iron and phosphorous. Many researchers have also advocated for incorporation of either defatted flour or roasted sunflower grits as protein enrichment of bakery products (Leelavathi et al, 1991, Tally et al, 1982, Rooney et al, 1982).
Nutrition facts

It is well known that sunflower seeds are one of the most nutritious and healthy foods to be found in the dried fruits sector. This is due to their high content of unsaturated fatty acids. Analysis data indicate that from the total acids about 70% are polyunsaturated, 20% monounsaturated and only 10% saturated. It should be noted here that unsaturated fatty acids are beneficial to the human organism and essential for proper nutrition. Furthermore, sunflower seeds do not contain any cholesterol at all, being meanwhile rich in proteins and fibers.

Sunflower seeds may be regarded as a health food of no or minimal processing (e.g. roasting), well-suited for a properly balanced diet. Generally, dried fruits, nuts and seeds are placed at the middle of the food guide pyramid.

According to a research conducted sunflower kernel was found to be rich in a number of components that have been shown to protect against cardiovascular and other diseases and to act as antioxidants and anti-carcinogens; thus the kernel can be considered a functional food. When considered in aggregate, the amazing kernel adds a nutritional wallop to a wide array of products such as breads, muffins, crackers, and snack foods. This is good news for consumers who are increasingly interested in functional foods. It’s also good news for manufacturers of baked goods and snack foods, because it provides the opportunity to consider kernel as an ingredient in new products in order to deliver upon this growing demand.

Sunflower kernel is also a good source of beta-carotene, vitamins, calcium, iron and phosphorous provided they are used in moderation, it is safe to use sunflower seeds on a regular basis. They can be added to breads and cereals, eaten as a snack, slow-roasted at low heat and sprinkled over salads. They are also used in the preparation of nutritious sauces and mock cheeses, or they can be soaked and blended into nut milks and Soya milk to improve their nutritional value. Popularizing sunflower kernel in the diet can help combating protein-calorie malnutrition in the children to a certain extent. Roasted seeds such as peanuts, almonds, cashew nuts etc are few popular snack foods but are costly; hence a need exists to find out cheaper substitutes. When considered in aggregate, the amazing sunflower kernel adds a nutritional wallop to a wide array of products such as breads, muffins, crackers and snack foods. Therefore, the present work is an attempt to develop shelled sunflower seed as a snack food and to evaluate its quality and acceptability. Such type of products may be good for consumers who are increasingly interested in functional foods. It’s also good news for manufacturers of baked goods and snack foods, because it provides the opportunity to consider kernel as an ingredient in new products in order to deliver upon this growing demand.

Various products prepared from kernels

Sunflower kernel caramel snack was prepared using different sugar and kernel composition. The sugar and kernel ratio selected for this study were 5:3, 5:4, 5:5, 6:3, 6:4, 6:5, 7:3, 7:4 and 7:5. The textural profile analysis (TPA) was conducted on thus prepared snacks using Texture Analyzer (model: TA-Hdi). The hardness, cohesiveness, springiness, chewiness and resilience were evaluated in the TPA. The TPA revealed that the hardness, cohesiveness and chewiness were in increasing trend with the increase in sugar level. The resilience was observed to be in decreasing trend with the increase in sugar level. The highest values of hardness (42.03N) and chewiness (228.15N) was observed in the product of 7:3 sugar and kernel composition and lower values 2.05N and 2.77N in the product of 5:5. Similarly, the resilience value was highest (0.78) in 5:5 and lowest (0.30) in 7:3 sugar and kernel composition. Selected panelists using a 9.0 Point hedonic scale compared the sensory attributes such as colour, texture, taste and overall acceptability of the above products. The sunflower kernel caramel prepared from 7:3 and 5:5 sugar and kernel composition scored highest and lowest ranking in all the above sensory attributes respectively. The lowest water
activity and colour (L) value of 0.475 and 38.74 were measured in 7:3 sugar and kernel mixed product. Hence, sunflower kernel caramel prepared from 7:3 sugar and kernel proportion appeared to be preferred in textural, sensory, colour and water activity characteristics.

**Fig. 1. Typical force-deformation curve for shelled sunflower seed caramel prepared from of 7:3 sugar and kernel proportion**

**Fig. 2. Effect of sugar and kernel level on overall acceptability of sunflower caramel**
Sunflower snack food was prepared from sunflower kernel, roasted in microwave for varying time intervals with added oil, salt and spices. The prepared sunflower snack food was evaluated for different quality parameters. On sensory evaluation, microwave heating for four minutes resulted in the best accepted snack food.

Sunflower seed can also be used as such in many ways. It can be sprinkled over breakfast cereal of soaked oats and diced fruits. It can also be added to garnish a raw soup with a sprinkle of sunflower seeds over the top just before serving. It can also be added to homemade trail mix of raw nuts, seeds, and diced dried fruits. Combine sunflower seeds with pine nuts when making a pesto sauce. Sunflower seeds could be soaked and paste could be prepared to be combined them with vegetables and fresh herbs, lemon or lime juice, and season to taste. Sunflower seeds could be added to a fruit and nut confection. It has been found that while baking bread addition of sunflower seeds provides a nutty flavor to bread. Muffins are more enjoyable when added sunflower seeds, either raw or toasted, that lend a pleasant texture to it.

Recommendations

1. Use of sunflower kernel as well as meal for the development of novel products should be promoted in the food industry.
2. Sunflower kernel should be added to breads and cereals, eaten as a snack, slow-roasted at low heat and sprinkled over salads and blended into nut milks and Soya milk to improve the nutritional value of products as well as lending better taste and texture to it.

References

Economics of Traditional Milk Products Manufacturing: A Guide for Entrepreneurs

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Introduction

Milk is the most important food for human health and nutrition, particularly in India because a large number of population being vegetarian. Moreover, the milk and milk products that fulfill the nutritional requirements of the people are comparatively cheaper than the non-vegetarian source.

Since the inception of the Operation Flood programme in July 1970, Indian dairying has witnessed a tremendous progress in milk production. And currently, with the annual growth rate of 5 percent, India has emerged as the world's largest milk producing country with milk production of 88 million tones in the year 2004.

Because of scattered milk production in remote areas, regional and seasonal surpluses, difficulties in transportation, lack of suitable marketing structure and its perishable nature, a significant portion of milk is being used for preparing a wide range of dairy delicacies. That has a long shelf life, since time immemorial. These dairy products provide a profitable outlet for milk (Chakraborty and Singh, 1998).

It has been estimated that about 55 percent of total milk produced in the country is converted into milk products out of which traditional milk products accounts for 43 – 44 percent in the following proportion Ghee (28%), Dahi (7%), Khoa (6.5%) and Chhana & paneer (2%) respectively. The major traditional dairy products being produced for sale in the market are Ghee, Dahi, Khoa, Chhana, paneer and khoa na dchhana based milk products like rasogolla, burfi, gulabjamun sandesh and chamcham etc.

Different types of indigenous dairy products are manufactured in India and each product has its own cost and profit. The knowledge about the cost and profit for different type of product manufactures would help the traders engaged in this activity to plan the size of their business. The products so chosen for the study are ghee, khoa, gulabjamun, burfi, paneer and rasogolla.

Ghee Production

Ghee is the clarified butter fat obtained from cow or buffalo or mixed milk. It is produced by heat desiccation of makkhan, butter or cram at 105 – 10 °C. Heat induced changes in milk protein/lactose during the clarification process impart a distinctive, pleasant cooked flavour to ghee. Ghee production forms the largest segment (28%) of the milk consumption and utilization pattern in India. With an annual growth rate of 5 percent, ghee production has been estimated in 2001 to exceed 1.3 billion tones, valued at Rs. 130 billion. About 12 percent of this production comes from the organized sector, half of which is contributed by co-operative sector (Aneja et. al., 2002). The method of ghee manufacture vary according to the bade material used viz. milk cream or butter, intermediate treatment of raw materials and handling of the semi finished or fully prepared ghee.

The methods are broadly classified as:

i) Desi method (indigenous method)

ii) Direct Cream method

iii) Creamery Butter method
iv) Pre-stratification method and  
v) Continuous method.

Indigenous method of ghee making, though unsuitable for large-scale production, is more popular as about 90 percent of ghee production in India is through this route. Most of the organized dairies manufacture ghee by the Creamery Butter method, because of convenience, continuity of process and high fat recoveries. Small creameries and entrepreneurs prefer ghee making by direct cream method, as it does not involve the use of butter churn. The pre-stratification method offers large energy saving as about 70-80 percent of the moisture and curd can be removed from butter without boiling.

As far as continuous method is concerned, to overcome the problems of batch method like limitation of scale of operation and excessive exposure of the plant operators to the stress of heat and humidity, the dairy plenty have evolved continuous ghee making system to suit their requirements.

**Khoa Production**

As a versatile intermediate for base for a wide range of sweets such as burfi, peda and gulabjamun, khoa occupies a prominent place in the traditional dairy products sector. According to PFA rules (1954) khoa is the product obtained from cow or buffalo (or goat or sheep) milk, or a combination thereof, by rapid drying. The milk fat content shall not be less than 20 percent of the finished product.

The annual production of khoa is estimated at more than one million tones, utilizing about 6 million tones of milk, equivalent to 6.5 percent of total milk production. Khoa production is mainly confined to the non-organized sector. However, now some 20 plants across the country have undertaken mechanized production of high quality khoa on an industrial scale, including a few on continuous production basis (Aneja et. al., 2002).

Traditional method of khoa making involves continuous boiling of milk along with scraping and stirring in a karahi/ S.S. Kettle on direct smoke – free fire. Typically, 4 to 6 litre lots of milk preferably (preferably buffalo) are taken in a shallow, steel pan and simmered over direct non smoky fire with constant and vigorous stirring and occasional scraping of the heating surface to avoid building of scale/scorching. Milk thickens progressively as the evaporation of moisture takes place constantly. Vigorous stirring and desiccation continued till the viscous product reaches a pasty consistency. The final product is ready when it starts of leaving the bottom and sides of the kettle and sticking together. The khoa pat is invariably made after removing the pan from the fire and working the contents up and down in a single compact mass. The major equipments needed for its preparation by traditional batch methods are: aluminum cans, karahi, gas burner, moulds etc.

Many mechanized systems have been developed for khoa making to suit its commercial production. The most successful and adopted by the dairy industry are ISSHE (Inclined scraped surface heat exchanger) developed by the NDDB and TSSHE (thin film scraped surface heat exchanger) developed by NDRI, Karnal. Both are continuous khoa making unit and can produce 50-100 Kg. product/hr. In ISSHE the feed is concentrated milk having 40-45 percent T.S., whereas in TSSHE, both whole milk and concentrated milk may be used. Both the units offer several advantages (Pal, 2001).

The yield of khoa depends upon the type of the milk used. When the milk is standerized to 4.5 percent fat and 8.5 percent SNF, its yield is about 20 percent. For commercial trade, three main types of khoa are recognized viz. Dhap, Pindi and Danedar, each type having preferred end uses like dhap is preferred for the preparation of gulabjamun & pantua, pindi for burfi & peda while danedar for kalakand & milk cake making.
Burfi

Burfi has been favoured as one of the most popular khoa based sweets all over India. The unique adaptability of khoa in terms of its flavour, body and texture to blend with a wide range of food adjuncts has permitted development of an impressive array of burfi varieties. Among these, fruit, nut, chocolate, coconut, saffron and rawa burfi are popular. A lot of variation can be observed in physical attributes of market samples. Good quality burfi however, is characterized by moderately sweet taste, soft and slightly greasy body and smooth texture with very fine grains. The method of manufacture is very simple and requires almost same equipment as for khoa making. Preparation of burfi is mainly confined to the non-organized sector, during the past decade a promising endeavour has been made to produce the burfi through mechanized systems. A mechanized process for commercial production of burfi was successfully developed by NDDB and installed at Sugam dairy, Baroda.

Gulabjamun

Gulabjamun is nationally popular khoa based sweet. Originally, it was made with khoa and maida. As it looked like the monsoon fruit, JAMUN, and was flavoured with rose water, it got its name of gulabjamun. Dhap khoa, having 40-45 percent moisture, is normally used for its production. Like other sweets, the manufacturing of gulabjamun is also largely in the hands of halwais who adopt small-scale batch method.

Paneer and Chhana

Paneer and chhana are well known traditional dairy products obtained by acid coagulation of hot milk. The two products primarily differ in their body & texture characteristics. While paneer is a block type soft cheese, which can be cut into cubes and slices, chhana is softer and can be kneaded into smooth dough. Chhana differs from paneer in that no pressure is applied to remove the whey from it.

Although paneer can be made from cow, buffalo or mixed milk, buffalo milk is preferred. In the traditional process, buffalo milk (6 % fat, 9% SNF) is boiled in a vessel. To coagulate the milk while still hot, a suitable coagulant (lime/alum/citric acid) is added, with slow stirring. Formation of clear whey is indicative of complete coagulation. Stirring is stopped, as the coagulum tends to coalesce. After the formation of large lumps is complete, contents of the vessels are poured over a muslin cloth to separate the coagulum from whey. The coagulum so obtained is highly pressed to facilitate formation of paneer blocks of suitable size, followed by their immersion in chilled water to impart them distinctive texture.

An estimated one percent of the country’s total milk production is converted into paneer. Its annual production is estimated at 150,000 tonnes. The cost of paneer production is low because of its significantly higher yield (17 – 18 percent) and short preparation time.

Chhana is used as an intermediate base for a wide variety of milk based Bengoli sweets. India’s total production of chhana is estimated at 200,000 tonnes, and the value of chhana based sweets, around 70,000 million (Aneja et. al., 2002). Typically, cow milk is used for chhana making, since it yields a softer, spongier product that is more suitable for Bengoli-sweets.

In traditional production of chhana, a small portion of boiled milk (0.5 – 1.0 kg) is transferred to a small coagulating vessel. The required amount of coagulant (usually previous day’s sour chhana whey) is added to the hot milk and stirred with wooden ladle till the coagulation is complete. The vessel contents are then poured over a piece of clean muslin cloth held over another vessel in which the whey gets collected. The muslin cloth containing the curd mass is hung to further drain out whey and to cool the chhana simultaneously.
Chhana based sweet

Rasogolla

Rasogolla was created in 1868 by Nobin chandra Das, a scion of Bengal’s famed sweet maker family K. C. Das. It is undoubtedly the king of all Indian sweets. The rasogolla production is largely confined to the cottage and small-scale industry. In recent years, the marketing in cans has become a flourishing business, with a number of brands jostling for shelf life in retail stores. Bikaner in Rajasthan has emerged as a leading center for the production of canned rasogolla and their marketing all over India as well as exports. Its annual production is estimated at 60,000 tonnes. The shelf life of canned rasogolla is three months. The yield of finished product (drained) is 254 g per 100 g of cow milk chhana.

Dahi Production

Dahi, whose history can be traced back to Vedic Age, is a fermented product and it is produced on cottage scale in all Indian homes with minor technology differences. Milk left surplus after consumption in Indian homes heated (simmered), cooled to 22-25 °C and inoculated with previous days starter culture @ 2 percent and allowed to incubate at that temperature until it forms a gel (curd). It is estimated that about 7 percent of total milk production is used for production of dahi. This is also intermediate in the preparation of ghee and shrikhand.

Costing of traditional dairy products

Accurate and specific information on the cost of production of selected product is of paramount for running the business on economic lines and earning optimal profits. It also helps in earthing out the cost components where the expenditure is on the higher side and could be curtailed.

For the purpose of cost study, costs are categorized into fixed cost and variable cost.

Fixed cost is the expenditure of an overhead nature which remains constant in short run and would even be incurred even if no output will produced and does not affect directly the output. The main items included in fixed costs are – depreciation (depreciation on building and depreciation on equipments) and interest on capital i.e. interest on capital that is invested on equipment & building and other structure. Variable cost implies the inputs of variable nature, which vary with the level of production during the production period for the part of variable cost. The items included in variable cost are – raw milk, labour (paid and family labour), fuel cost and chemical and detergent costs.

Chakraborty and Singh, 1998 and Kumar and Singh, 1992 studied the cost of production of chhana based sweets in Calcutta and cost of production of khoa in Munger district of Bihar respectively and reported that in all the products variable cost account for more than 98 percent and fixed cost to less than 2 percent of the total cost of production.

Costing of selected product is given below in tabular form.

Conclusion

It has been noticed that the indigenous dairy products are by and large produced by petty small milk sweet makers in the urban areas with exception of few large manufacturers. The sweet meat makers uses traditional methods for producing these sweets prevalent in the area and yield moderate to heavy profits depending upon the keeping quality and time of sale. It would be to the advantageous of the milk plants to enter this field by using their available infrastructure comprising of plants and machinery and trained manpower and
thereby get better returns. Presently a good attempt has been taken by some organized dairies and co-operative dairies across the country by entering in this arena. A concentrated effort in this direction has, therefore, to be made to improve the keeping quality and selection of suitable packaging materials for such products for sale in the domestic as well as foreign market.

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Dairying – A Tool for Entrepreneurship

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Introduction

Indian dairying is emerging as a sunrise industry. It is crucial for rural economy and livelihood. India represents one of the world’s largest and fastest growing markets for milk and milk products due to the increased disposable incomes among the 250 million strong middle class. With an annual growth rate of over 5 per cent the country’s milk production is expected to exceed 250 million litres per day (92 million tones per year) as a result India emerging as the world’s no. one milk producer.

Profile of the Indian dairy industry:

1. Human population : 1053 million (70 million dairy farmers)
2. Bovine population : Total 283 million of which 186 million cows & 97 million buffaloes
3. Milk production : 92 million tones
4. Average annual growth rate of Milk Production : 4.5 %
5. Per capita availability of milk : 233 g/day or 85 kg / year
6. Milk yield per breedable bovine : 400 to 1000 kg / lactation
7. Per capita monthly consumption expenditure of milk and milk products : Rs. 42.56 in Rural and Rs. 74.18 in urban areas
8. Per capita monthly consumption expenditure on Total food : Rs. 288.80 in Rural and Rs. 410.10 in urban areas
9. Value of output of milk and milk products : Rs. 1075.44 Billions
10. Share of Agriculture Sector in GDP from 1980-81 to 2002-03 : Rs. 425 Billions to Rs. 4560 (34.72 % to 20.27 %)
11. Share of Live Sector in GDP from 1980-81 to 2002-03 : Rs. 59 Billions to Rs. 1209 (4.82 % to 5.37 %)

The world dairy is zooming on India for its rapidly growing markets and ever increasing share in the GDP contributing > 25 % of total value of output from agriculture and allied sector. The changing international dairy trade pattern following GATT and the emergence of the World Trade Organization (WTO) offers to the Indian dairy industry an opportunity to take its bow as an exporter. India’s enthusiasm to integrate with the world economy is reflected in the technological upgradation, professional excellence and a cost effective approach. It is already recognized as a sourcing center for exports of products and services to countries in Asia – the powerhouse of fastest growth in the world. Its central geographical location in the region gives it an extra competitive edge.

Two main reasons for the world focus on India are: one, the low cost economy; and two, the liberalization process initiated since 1991. Other important factors include low inflation rate, inexpensive labour, the presence of the world’s third largest pool of technical manpower, the worlds largest democracy and an independent judiciary, well established and free from government interference and ease in communication due to wide spread use of English among the educated and the professional class.
Dairy Sector – A SWOT Analysis

Dairying has now emerged as an important income generating activity and a source of mass employment in rural areas – the basis of the White Revolution.

Strengths

The Indian dairying with its vastness contributes rather uniquely to the nations health and wealth. Factors that give strength include:

• Cattle is the foundation of Indian agriculture. For the large majority of small farmers, cattle is perhaps the only tangible asset and mainstay for the socio-economic security. Dairy farmer helps directly in increasing crop production by making available draught power, manure, and cash income on day-to-day basis.
• This is the sector where poor contribute to growth directly instead of getting benefit from growth generated elsewhere.
• Dairying as a small enterprise is mostly common with landless labourers, marginal and small farmers, the progress in this sector result in more balanced development of the rural economy, particularly in reduction of poverty ratio.
• Dairying is crucial in providing employment and supplementary income to the bulk of rural families. The main beneficiaries are woman who contribute over 70 per cent of labour in cattle rearing.
• Crop residues and by products fed to the cattle form the basis of “grain saving” dairying appropriate to the mixed farming system.
• The buffalo is India’s milking machine, accounting for more than half of the country’s milk production. It is notable for its efficiency as a converter of coarse feeds into rich milk. It is preferred by the dairy processors not only for its higher total solids but also for its higher fat content.
• Cooperative dairying has spread the many benefits of this sector in rural India.
• The ever-increasing population with their increasing purchasing power and increasing level of awareness towards balanced diet gives it the assured market for milk and milk products.
• The existence of un-organized sector which utilizes ~ 80 % of the total milk produced can be tapped for proper channelization.
• With the rapid growth in research and development, infrastructure, technical know-how, professionally trained manpower and resource base act as pillars for the sustained growth of the sector.

Weaknesses

The dairy sector is not without its share of constraints. Some weaknesses include:

• Inability to feed cattle adequately throughout the year resulting into seasonal variability remains the most widespread technical constraint to higher milk yield.
• Quality dairy animals are in short supply. Artificial insemination service for breeding better cattle has limited coverage, barely reaching an estimated 10 per cent of bovines.
• The animal health cover is getting increasingly neglected. In many states, over 70-80 per cent of the veterinary budget is used for the staff salaries and jeeps with little left to buy medicines and other supplies.
• Limited marketing support handicaps rural milk producers seriously. Dairy producers in remote areas are neglected.
• Limited investment in setting up or expansion of milk procurement network is another bottleneck.

• The immediate problem of Indian dairy industry is not just short fall in milk availability but poor infrastructure for transporting, processing and distributing rurally produced milk to major consumer centers in urban areas posing problems to procurement and distribution.

• Improvement in raw milk by its chilling, refrigerated storage and transport is vital for making quality products because of the perishable nature of milk and its products.

• The rural women, an invisible partner need access to training in modern cattle management to maximize returns.

• Despite the vast potential and huge resource base available, entrepreneurial ability is lacking among milk producers.

Opportunities

• India has been described by one FAO expert as a “slumbering giant” of the international dairy trade.

• New initiatives and investment to strengthen the infrastructure in animal production would lead to modernization of this long neglected sector.

• It also holds promise to transform the quality of life of those most neglected in rural India.

• A vast scope exists to increase milk yield through better utilization of crop residue and by products by upgrading them.

• Similarly, paying attention to animal health care would minimize the economic losses caused by many major cattle diseases such as rinderpest, mastitis and FMD.

• The mass production of indigenous milk based sweets in modern dairy plants can tap its growing demand by value addition.

• With >150 million NRI overseas the scope for their export is promising.

Threats

Dairying is also facing threats from many quarters. These include:

• A large cattle population – 200 million cattle and 76 million buffaloes – grazes on uncultivated lands, forest areas and common property resources. This imposes a heavy social cost, leading to degradation and denudation of land and loss of natural resources base.

• Delicensing has checked the flow of investment by cooperatives in procurement and related infrastructure in their milk shed districts. It has also affected the extension services for enhancing milk production.

• Unorganized way of dairy products preparation and marketing by vendors harming the interests of producers and consumers.

• The high cost of credit is another adverse factor that reduces the viability of the dairy projects.

In addition to the SWOT analysis, the successful Dairy Entrepreneur must have a proper understanding of the four ‘P’: Procurement, Production, Processing and Promotion.

Procurement: It covers collection of milk from rural producers or contractors including setting up of chilling centers, provision of laboratory equipment and supplies, milking machines, cattle welfare, including feed and fodder and last but not the least the transportation.
**Production:** It includes activities of producing various types of liquid milks like the conventional whole, toned and standardized as well as innovative like milk with extra nutrition for school children, pregnant mothers, the aged and the infirm: low fat milk for the calories conscious. The key is to sale milk also as a fun product and not merely as something, which is good for health.

**Processing:** Processing of products such as butter and cheese spread, presliced butter and cheese, dairy whiteners, milk beverages (Plain and Carbonated), butter oil as a cooking medium, whip-and-serve milk shake powders, wet and dry kulfi and ice cream mix, high protein whey drinks for sports man, milk sweets, Shrikhand, dried condensed milk, dried khoa and many more can be added the list.

**Promotion:** It covers activities like brand promotion, setting up of dairy parlours, buying milk in bulk and repacking to sell, distribution, devising attractive packaging and other such activities, which will result in building an image either nationally or even regionally and enhance the marketing of the products.

**Conclusion**

India with her sizeable dairy industry growing rapidly and on the path of modernization with the post delicensing era has started attracting a large number of entrepreneurs. Thus, Dairying constitutes a very active sector of the Indian economy - vibrant and innovative enterprise - is much needed as a part of a progressive economy. Their success depends on the efficient and economical procurement network, hygienic and cost-effective processing facilities and innovativeness in the marketplace. The entrepreneur following this would have a place in the sun of prosperity for many decades to come.

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Entrepreneurship and Scope of Dairy Industry

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An entrepreneur is an individual who accepts financial risks and undertakes new financial ventures. The word derives from the French “entre” (to enter) and “prendre” (to take), and in a general sense applies to any person starting a new project or trying a new opportunity.

Many societies place great value on the entrepreneur. To encourage their activity, they may be offered access to inexpensive capital, tax exemptions and management advice. An entrepreneur has the greatest chance of success by focusing on a market niche either too small or too new to have been noticed by established businesses. To help new technologies come to market, many universities establish business incubators for entrepreneurs hoping to turn leading edge research into marketable products.

Characteristics of an entrepreneur include spontaneous creativity, the ability and willingness to make decisions in the absence of solid data, and a generally risk-taking personality. An entrepreneur may be driven by a need to create something new or build something tangible. In the Austrian school of Economics, entrepreneurs are described as being engaged in the creative destruction of existing products and services. As new enterprises have low success rates, an entrepreneur must also have considerable persistence.

Entrepreneurs are generally highly independent, which can cause problems when their ventures succeed. In a small company the entrepreneur is able to personally manage most aspects of the business, but this is not possible once the company has grown beyond a certain size. Management conflicts often arise when the entrepreneur does not recognize that running a large stable company is different from running a small growing company. The problem is often resolved by the entrepreneur either leaving to start a new venture, or being forced out by shareholders. At Apple Computer, for example, one founder, Steve Wozniak, left to pursue other interests, while the other, Steve Jobs was ultimately fired and replaced with a CEO from a much larger company. Note that many years later, Jobs returned to the helm.

An intrapreneur is an individual who acts like an entrepreneur but from inside the confines of a large organization or corporation.

Dairy Industry

India ranks first globally in production of buffalo milk and second in production of whole fresh cow milk. It produces 50,000,000MT of buffalo milk (FAO, 2004) and 37,800,000MT of whole fresh cow milk (fao, 2004). The primary source of milk and other dairy products in the state is buffalo. Punjab ranks at the top in the country in availability of milk. A large portion of the population is lacto-vegetarian so milk and dairy products are an important source of protein the diet. The proportion of income spent on milk and milk products has considerably increased both in rural as well as urban areas.

Upside

• Constructive role in promoting rural welfare and reducing poverty
• Increasing demand and supply in urban scenario
• The new dairy plant capacity approved under MMPO (100 million lpd) would surpass the projected rural marketable surplus of milk
**Downside**
- Better handling of raw milk
- Better operational efficiencies (adoption of GMP and HACCP)
- Strengthening of cold chain

**SWOT Analysis of Dairy Industry**

**Strengths**
- Demand profile (encouraging, optimistic)
- Margins (quite reasonable)
- Flexibility of product mix
- Availability of raw material (abundant)

**Weaknesses**
- Perishability
- Lack of control over yield
- Logistics of procurement
- Problematic distribution

**Opportunities**
- Introduction of value added products
- State level technologies such as artificial insemination, multiple ovulation, embryo transfer, development of transgenic animals, improved cattle feed and bypass protein feed technology to increase milk yield
- Installation of electronic milk testers
- Widespread usage of farm bulk coolers
- Enzymatic protection by lacto peroxidase system

**Threats**
- Dominance of milk vendors causing harm both producers and consumers

**Development Perspective**

The modernization of the manufacturing process of traditional dairy products is long overdue. Modernization will not only result in the broadening of dairy industry but also help in energy saving. Eg recovery of heat energy while manufacturing of traditional products, evaporation of milk in vacuum evaporator, development of whey based products.

In recent years process innovations have been initiated at NDDB and NDRI for the production of burfi, khoa, kheer, srikhand, rasgolla by adopting western tools and technology:
- Reverse osmosis techniques can be used for making of channa and concentration of milk for many indigenous products
- Use of meat ball forming machines for making of gulabjamun on large scale
- Packaging innovations like packing mozzarella cheese in whey consumer packs, chocolate and candy packaging lines can be used to pack burfi and peda
- Tetra packs can be used to pack basundi, kheer, sevian
Dream For Punjab

While enunciating a development perspective for Punjab, an essential prerequisite is to spell out a vision for the state the kind of economy, society, polity, ecology and ideology envisaged for it, over a given period of time. This style of dealing with the issue is strikingly different from the usual style wherein the future agenda is set in the light of the evolving scene, particularly with reference to problems that have emerged on the way. The intention is to define and work out a feasible dream for the state and thus go beyond the conventional diagnostic and curative approach.

In its bare essentials, the state has to be not only efficient and progressive economically, just and harmonious socially, democratic and participatory politically, friendly and prudent ecologically, aesthetic and functional spatially, but also civil and sustainable systemically. In this light, one can envision Punjab eventually as a region which is sub-urban, displaying a continuum of rural and urban, agriculture and non-agriculture, with a hierarchy of settlements interlinked by a free-flowing transport network; thereby serving as a stage for what is envisioned. Herein, symbolically, the role of a development architect, social scientist and a professional practitioner gets entwined. Things would have been easy if Punjab were a clean slate to work on. Certainly it is not. This poses a real challenge. The evolved scene has to be redesigned and reconstructed rather than being built anew.
Dairying – A Tool for Entrepreneurship

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Introduction

Indian dairying is emerging as a sunrise industry. It is crucial for rural economy and livelihood. India represents one of the world’s largest and fastest growing markets for milk and milk products due to the increased disposable incomes among the 250 million strong middle class. With an annual growth rate of over 5 per cent the country’s milk production is expected to exceed 250 million litres per day (92 million tones per year) as a result India emerging as the world’s no. one milk producer.

Profile of the Indian dairy industry

1. Human population : 1053 million (70 million dairy farmers)
2. Bovine population : Total 283 million of which 186 million cows & 97 million buffaloes
3. Milk production : 92 million tones
4. Average annual growth rate of milk production : 4.5 %
5. Per capita availability of milk : 233 g/day or 85 kg/year
6. Milk yield per breedable bovine : 400 to 1000 kg/ lactation
7. Per capita monthly consumption expenditure of milk and milk products : Rs. 42.56 in Rural and Rs. 74.18 in urban areas
8. Per capita monthly consumption expenditure on Total food : Rs. 288.80 in Rural and Rs. 410.10 in urban areas
9. Value of output of milk and milk products : Rs. 1075.44 Billions
10. Share of Agriculture Sector in GDP from 1980-81 to 2002-03 : Rs. 425 Billions to Rs. 4560 (34.72 % to 20.27 %)
11. Share of Live Sector in GDP from 1980-81 to 2002-03 : Rs. 59 Billions to Rs. 1209 (4.82 % to 5.37 %)

The world dairy is zooming on India for its rapidly growing markets and ever increasing share in the GDP contributing > 25 % of total value of output from agriculture and allied sector. The changing international dairy trade pattern following GATT and the emergence of the World Trade Organization (WTO) offers to the Indian dairy industry an opportunity to take its bow as an exporter. India’s enthusiasm to integrate with the world economy is reflected in the technological upgradation, professional excellence and a cost effective approach. It is already recognized as a sourcing center for exports of products and services to countries in Asia – the powerhouse of fastest growth in the world. Its central geographical location in the region gives it an extra competitive edge.

Two main reasons for the world focus on India are: one, the low cost economy; and two, the liberalization process initiated since 1991. Other important factors include low inflation rate, inexpensive labour, the presence of the world’s third largest pool of technical manpower, the worlds largest democracy and an independent judiciary, well established and free from government interference and ease in communication due to wide spread use of English among the educated and the professional class.
Dairy Sector – A SWOT Analysis

Dairying has now emerged as an important income generating activity and a source of mass employment in rural areas – the basis of the White Revolution.

Strengths

The Indian dairying with its vastness contributes rather uniquely to the nation’s health and wealth. Factors that give strength include:

- Cattle is the foundation of Indian agriculture. For the large majority of small farmers, cattle is perhaps the only tangible asset and mainstay for the socio-economic security. Dairy farmer helps directly in increasing crop production by making available draught power, manure, and cash income on day-to-day basis.
- This is the sector where poor contribute to growth directly instead of getting benefit from growth generated elsewhere.
- Dairying as a small enterprise is mostly common with landless labourers, marginal and small farmers, the progress in this sector result in more balanced development of the rural economy, particularly in reduction of poverty ratio.
- Dairying is crucial in providing employment and supplementary income to the bulk of rural families. The main beneficiaries are women who contribute over 70 per cent of labour in cattle rearing.
- Crop residues and by products fed to the cattle form the basis of “grain saving” dairying appropriate to the mixed farming system.
- The buffalo is India’s milking machine, accounting for more than half of the country’s milk production. It is notable for its efficiency as a converter of coarse feeds into rich milk. It is preferred by the dairy processors not only for its higher total solids but also for its higher fat content.
- Cooperative dairying has spread the many benefits of this sector in rural India.
- The ever-increasing population with their increasing purchasing power and increasing level of awareness towards balanced diet gives it the assured market for milk and milk products.
- The existence of un-organized sector which utilizes ~ 80 % of the total milk produced can be tapped for proper channelization.
- With the rapid growth in research and development, infrastructure, technical know-how, professionally trained manpower and resource base act as pillars for the sustained growth of the sector.

Weaknesses

The dairy sector is not without its share of constraints. Some weaknesses include:

- Inability to feed cattle adequately throughout the year resulting into seasonal variability remains the most widespread technical constraint to higher milk yield.
- Quality dairy animals are in short supply. Artificial insemination service for breeding better cattle has limited coverage, barely reaching an estimated 10 per cent of bovines.
- The animal health cover is getting increasingly neglected. In many states, over 70-80 per cent of the veterinary budget is used for the staff salaries and jeeps with little left to buy medicines and other supplies.
- Limited marketing support handicaps rural milk producers seriously. Dairy producers in remote areas are neglected.
• Limited investment in setting up or expansion of milk procurement network is another bottleneck.

• The immediate problem of Indian dairy industry is not just short fall in milk availability but poor infrastructure for transporting, processing and distributing rurally produced milk to major consumer centers in urban areas posing problems to procurement and distribution.

• Improvement in raw milk by its chilling, refrigerated storage and transport is vital for making quality products because of the perishable nature of milk and its products.

• The rural women, an invisible partner need access to training in modern cattle management to maximize returns.

• Despite the vast potential and huge resource base available, entrepreneurial ability is lacking among milk producers.

Opportunities

• India has been described by one FAO expert as a “slumbering giant” of the international dairy trade.

• New initiatives and investment to strengthen the infrastructure in animal production would lead to modernization of this long neglected sector.

• It also holds promise to transform the quality of life of those most neglected in rural India.

• A vast scope exists to increase milk yield through better utilization of crop residue and by products by upgrading them.

• Similarly, paying attention to animal health care would minimize the economic losses caused by many major cattle diseases such as rinderpest, mastitis and FMD.

• The mass production of indigenous milk based sweets in modern dairy plants can tap its growing demand by value addition.

• With >150 million NRI overseas the scope for their export is promising.

Threats

Dairying is also facing threats from many quarters. These include:

• A large cattle population – 200 million cattle and 76 million buffaloes – grazes on uncultivated lands, forest areas and common property resources. This imposes a heavy social cost, leading to degradation and denudation of land and loss of natural resources base.

• Delicencing has checked the flow of investment by cooperatives in procurement and related infrastructure in their milk shed districts. It has also affected the extension services for enhancing milk production.

• Unorganized way of dairy products preparation and marketing by vendors harming the interests of producers and consumers.

• The high cost of credit is another adverse factor that reduces the viability of the dairy projects.

In addition to the SWOT analysis, the successful Dairy Entrepreneur must have a proper understanding of the four ‘P’: Procurement, Production, Processing and Promotion.
Procurement

It covers collection of milk from rural producers or contractors including setting up of chilling centers, provision of laboratory equipment and supplies, milking machines, cattle welfare, including feed and fodder and last but not the least the transportation.

Production

It includes activities of producing various types of liquid milks like the conventional whole, toned and standardized as well as innovative like milk with extra nutrition for school children, pregnant mothers, the aged and the infirm: low fat milk for the calories conscious. The key is to sale milk also as a fun product and not merely as something, which is good for health.

Processing

Processing of products such as butter and cheese spread, presliced butter and cheese, dairy whiteners, milk beverages (Plain and Carbonated), butter oil as a cooking medium, whip-and-serve milk shake powders, wet and dry kulfi and ice cream mix, high protein whey drinks for sports man, milk sweets, Shrikhand, dried condensed milk, dried khoa and many more can be added the list.

Promotion

It covers activities like brand promotion, setting up of dairy parlours, buying milk in bulk and repacking to sell, distribution, devising attractive packaging and other such activities, which will result in building an image either nationally or even regionally and enhance the marketing of the products.

Conclusion

India with her sizeable dairy industry growing rapidly and on the path of modernization with the post delicensing era has started attracting a large number of entrepreneurs. Thus, Dairying constitutes a very active sector of the Indian economy - vibrant and innovative enterprise - is much needed as a part of a progressive economy. Their success depends on the efficient and economical procurement network, hygienic and cost-effective processing facilities and innovativeness in the marketplace. The entrepreneur following this would have a place in the sun of prosperity for many decades to come.

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Development of Low Fat Fiber Enriched Ice Cream - Scope of Entrepreneurship

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Introduction

Ice cream is a delicious, wholesome and nutritious frozen dairy food. Its past goes back to the ancient period, but its future seems endless. It represents one of the most dynamic sectors to the dairy industry; and has, for two decades been the sector wherein the most value addition has taken place. It is the product liked invariably by one and all and popular throughout the world. Ice cream has occupied a unique place in the diet of western people and is gaining popularity all over the world. Thanks to the innovation in functional ingredients, technology, distribution and communication, ice cream and frozen desserts market in India has been witnessing an unprecedented growth.

Of late, there is an increasing consumer-awareness vis-a-vis a relation between diet and health. Further, the customers are even willing to pay extra for food that can give some health benefits. Now-a-days, there is a trend for health foods. Low calorie, reduced calorie foods and diabetic foods are becoming increasingly popular in all segments of the food industry. Ice cream and frozen desserts, which are considered rich in calories and indulgent, are now supposed to be of reduced fat and sugar content and low in calories. The alarming increase in obesity, diabetes and Cardio Vascular Heart Disease (CHD) has added a new dimension to this scenario.

Ice cream is a good source of important nutrients like fat, protein, carbohydrate, minerals and vitamins. However, like any other dairy products, ice cream too, lacks in dietary fiber content. Fiber is the new magic word in nutrition and with a good reason! A menu high in fiber is now believed to reduce the risk of diabetes, to lower serum cholesterol, and to play a role in the prevention of heart disease and some types of cancer.

Present Status of Ice Cream Industry in India

The ice cream industry in India started in the small-scale sector, but because of increasing popularity of ice cream a number of large-scale plants have also entered the market. The liberalization process gave way to organized sector as it had been in the domain of small scale earlier. With an average annual growth rate of 15 per cent, ice cream industry presently scoops market worth more than 1400/- crore in India out of which organized sector accounts for about 65 per cent. There are about 150 players in the organized sector and over 2000 units in unorganized sector. Amul has achieved highest market share of (32%) followed by Hindustan Lever Limited (8%), Vadilal (7%), Mother dairy (7%), Dinshaw and Arun (4%), and Metro (3%). However, still per capita consumption is one of the lowest in the world, which is just 0.7 litre per annum in India as compared to consumption of 22, 19, 17, 13 and 13 litres per annum an USA, New Zealand, Australia, Sweden and Italy, respectively.

Composition of Ice Cream

The composition of ice cream is usually expressed as a percentage of it’s constituents, i.e., percentage of milk fat, milk solids not fat (serum solids), sugar, stabilizer, total solids etc. Its composition varies in different localities and in different market. The best ice cream composition for a manufacturer to produce is often difficult to establish. After considering the legal requirements, quality of product desired raw materials available, plant equipment and processes, trade demands, competition and cost.
According to Prevention of Food Adulteration Act and Rules (1954), “Ice cream is a frozen product obtained from cow or buffalo milk or a combination thereof or from cream and/or other milk products with or without the addition of cane sugar, eggs, fruits, fruit juices, preserved fruits, nuts, chocolate, edible flavours and permitted food colours. It may contain permitted stabilizers and emulsifiers not exceeding 0.5 per cent by weight. The mixture must be suitably heated before freezing. The product should contain not less than 10 per cent milk fat, 3.5 per cent protein, and 36 per cent total solids”.

With regards to the fat content mainly 4-grade ice cream can be found usually in most market areas. One grade just meet the minimum fat content, often has over run that approaches the maximum allowed by law. At other extreme are the so called premium ice cream are high in fat and low in over run. A third grade of ice cream designed, as a compromise between the minimum fat and premium product, is the type that has dominated the market for many years. And a fourth grade, often referred to as super premium ice cream, is characterized by higher fat content and lower overrun than premium varieties. Representative formulae for these grades have been suggested as below in table (Kilara, 1993).

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Minimum Standard (%)</th>
<th>Regular (%)</th>
<th>Premium-1 (%)</th>
<th>Premium-2 (%)</th>
<th>Super Premium (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk fat</td>
<td>10.10</td>
<td>10.10</td>
<td>12</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>Milk solids nonfat</td>
<td>7.5</td>
<td>9</td>
<td>10</td>
<td>10.5</td>
<td>9.5</td>
</tr>
<tr>
<td>Whey solids</td>
<td>2.5</td>
<td>2</td>
<td>1.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sucrose</td>
<td>4.5</td>
<td>7.6</td>
<td>12</td>
<td>12.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Corn syrup solids</td>
<td>9</td>
<td>6.8</td>
<td>5</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>High fructose solids</td>
<td>4.5</td>
<td>2.6</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stabilizer</td>
<td>0.5</td>
<td>0.15</td>
<td>0.13</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>Emulsifier</td>
<td>0.3</td>
<td>0.25</td>
<td>0.15</td>
<td>0.10</td>
<td>-</td>
</tr>
<tr>
<td>Total solids</td>
<td>38.55</td>
<td>38.50</td>
<td>40.78</td>
<td>41.22</td>
<td>41.22</td>
</tr>
</tbody>
</table>

Low Fat Ice Cream

Excessive intake of high fat products has been associated with increased risk of obesity, certain forms of cancer, high blood cholesterol, diabetes and coronary heart diseases. Nutrition expert suggest that total intake of dietary fat should be limited to not more than 30% of daily energy intake.

According to FAO/WHO release, 1.2 billion people are overweight and approximately 250 million people are obese. World over overweight is a bigger problem than undernourishment. Worldwide 177 million or 5.2 per cent of adult population are affected. The majority of this population is in Asia. Type 2 or non-insulin dependent diabetes mellitus which is about 95 per cent of total cases, which can be managed through diet modifications especially the type of carbohydrates.

As a result of awareness of the harmful effect of excess fat on human health, there has been increasing demand of low fat or no fat products. According to recent survey conducted in India, on routine market research, the consumers have to cut back on the ice cream consumption because of fear of adverse impact on health (Ray, 2000).

A market survey in the U.S.A also confirmed a strong interest in low calorie frozen desserts and ice cream but indicated that the existing products of this type have a poor flavor and texture. Reducing intake of dietary fat and cholesterol is rapidly becoming an obsession.
among national health groups. The Dairy Council of California urges the entire dairy industry to shape new nutrition recommendation based on low fat products (Carson, 1988).

Hence, healthier ice cream for a specific group of people will be the focus point of prominence for the Indian ice cream manufacturers in the coming decade. The above factors are responsible for creation of new market segments with enormous opportunities, which can be encashed by being creative and innovative. Greater products diversity and more consumer choice are expected to drive the growth in this health and functional food segment.

Thus, low fat ice cream will be highly active product if made of an acceptable quality. But the low fat level in ice cream results into texture and flavor impairment of the product. As a result, a large amount of product development time has been used in searching for a combination of ingredients that will replace the texture and flavor characteristics of fat in the ice cream (Ohmes et al., 1998, Aime et al., 2001) and these often involved the use of fat replacers. High quality frozen desserts containing 5-6 per cent fat have been produced without fat replacers, but mixes containing less than 4-5 per cent fat usually require additional ingredients specifically chosen for their fat replacing properties.

Under the provision of Nutritional Labeling and Education Act (NLEA), frozen desserts can now be labeled “Reduced fat” if the reformulated product contain 25 percent less fat than the original formulation. The term “Lite/Light” can be used if a 50 per cent reduction of calorie is achieved. A product can be labeled “Low fat” if one serving of the food contains no more than 3 grams of fat and food may be labeled as “Fat free” if it contains less than 0.5 grams of fat per serving. Serving sizes are defined and an average serving size for ice cream and frozen desserts is 118.75 ml (Kilara, 98).

**Fat Replacers in Ice Cream**

Fat replacers are the ingredients used to replace fat in food system. In some cases fat replacer is only an essential ingredient to perform the desired function, while in other cases a combination of fat substitute, bulking agent or low calorie sweetener is being used. Fat replacers are categorized into 2 broad groups: (i) Fat substitutes which include fat based fat replacers and (ii) Fat mimetics; which mainly include carbohydrate based viz. Paselli SA2, Stellar, Inulin and Oligofructose and protein based fat replacers viz. Simplesse, Dairy Lo and WPC etc.

These fat replacers create the creamy sensation and improve the meltdown properties. Some of research workers have made efforts in this direction to develop low fat product using fat replacers. Schmidt et.al. (1993) reported that ice cream mixes made with protein based fat mimickers had similar rheological and melting properties as compared to control but higher air incorporation. Whereas use of carbohydrate based fat mimickers changed the rheological properties resulting in higher viscosities, greater deviation from Newtonian flow and less air incorporation. Prindiville et.al. (1999) analyzed low fat and non fat chocolate ice cream made with 2.5% milk fat, cocoa butter or one of the two whey protein based fat replacers, Dairy Lo or Simplesse and reported that Simplesse was more similar to milk fat than Dairy Lo in its effect on brown colour, cocoa flavour, cocoa character and textural stability but was less similar in terms of thickness and mouth coating.

**Fiber Enrichment in Ice Cream**

In 1953, Hipsley first used “dietary fiber” to designate non digestible plant cell wall constituents. According to the American Association of Cereal Chemists (AACC, 2001) dietary fiber is the remnants of the edible parts of plants or ‘analogous’ carbohydrates that are resistant to digestion and absorption in human small intestine with complete or partial fermentation in the large intestine; it includes polysaccharides, oligosaccharides, lignin, and associated plant substances. Further, dietary fiber exhibits one or more of three major physiological impacts: laxation (fecal bulking and softening, increased frequency and/or regularity), blood cholesterol attenuation, and blood glucose attenuation fiber.
Dietary fiber has been associated with alterations of the colonic environment that protects against colorectal diseases. Among the theories on colonic carcinogenesis are those that involve increased concentrations of bile acid and their metabolites, alterations in colonic pH, low Ca\(^{++}\), elevated NH\(_3\), and long chain fatty acid concentrations, and alterations in bacterial profiles. Fiber may also provide protection by increasing fecal bulk, which dilutes the increased colonic bile acids concentrations that occur with a high fat diet. Short chain fatty acids, including butyric acid, and dietary sugar beet fiber also suppress cholesterol synthesis in a rat liver and intestine model (Kumar, 2005).

Having little nutritional value, dietary fiber has emerged as a unique health promoting food ingredient and assumes a special significance with regard to dairy products, which in their pure form, are essentially devoid of fiber. Like any other dairy products ice cream too, lacks in dietary fiber content. Thus the incorporation of dietary fiber would add value to the ice cream not only in terms of variety but also their enhanced healthfulness. On the basis of the several research evidences generated during the last two decades, dietary fiber has covered a long distance in establishing its health related benefits, particularly with regard to lowering blood cholesterol level, control of glucose level, and in relieving of constipation. These disorders can, however, largely be overcome by either consuming foods naturally high in dietary fiber or the foods fortified with dietary fiber (Patel and Arora, 2005).

In ice cream fiber enrichment could be achieved in two major ways: first, incorporation of fiber-rich natural foods like fruit pulps and nuts and second, blending of commercially available purified fibers or fiber preparations.

Dietary fiber is made up of two main types—insoluble and soluble. Soluble fiber forms a gel when mixed with liquid, while insoluble fiber does not. Insoluble fiber passes through digestive tract largely intact and more quickly than soluble fiber, preventing or relieving constipation. It may prevent colon cancer by moving cancer-causing substances through digestive tract more quickly. Both types of fiber are important in the diet and provide benefits to the digestive system by helping to maintain regularity (Mann and Sigh, 2005). The US Food and Drug Administration (FDA) has authorized the following claims that food manufacturers can place on their labels:

- Diets low in saturated fat and cholesterol and rich in fruits, vegetables and grain products that contain fiber, particularly soluble fiber, may reduce the risk of coronary heart disease.
- Diets low in saturated fat and cholesterol that include 3g of soluble fiber from whole oats per day may reduce the risk of heart disease.
- A low-fat diet rich in fruits, vegetables and whole grain containing fiber (particularly Soluble fiber) may lower blood cholesterol levels and reduce risk of heart diseases. This type of diet may also reduce the risk of some types of cancer.
- Diets low in saturated fat and cholesterol that include a daily intake of soluble fiber from whole oats or psyllium seed may reduce the risk of heart disease.

Inulin and Oligofructose as a Source of Fiber

Inulin and oligofructose are natural ingredients, having functionality similar to other carbohydrates but provide less energy on a weight for weight basis. Raftiline is the trade name of inulin and is extracted from chicory root. Inulin is present in significant quantities in vegetables such as artichoke, asparagus, onion, garlic and wheat. In chicory roots, however it is present in abundant amounts (Coussement, 1996). Inulin is a straight chain polysaccharide made by b(2-1) linkages of fructose units. The molecules have approximately 60 units of fructose and end with a glucose molecule (Frank, 1992 and Coussement, 1997).

Raftiline also acts as a dietary fiber, as we consume roughly two third of our recommended daily allowance (RDA) of dietary fiber, using raftiline could help us to achieve a more balanced diet (Frank, 1995). Raftiline is not hydrolysed in the digestive tract thus it doesn’t increase
insulin levels, making it an ideal for diabetic patients, besides it has a low calorific value (1 Kcal / gm) and also acts as a prebiotic thus increases the beneficial bifido bacteria (5-10 times) in the intestine (Coussement, 1995). It is quite acid and heat stable besides it gives a slight impression of sweetness (less than 10 per cent in comparison to sucrose). It offers a smooth, creamy texture and mouthfeel. Using small amounts of Raftiline allows the taste and texture of low fat products to be improved. It gives more balanced flavor, body and mouthfeel and stabilizes emulsions and dispersions. The addition of Raftiline in reduced fat dairy products gives mouthfeel of full fat products and nutritional up gradation due to it is bifidogenic dietary fiber properties (Frank, 1992). So inulin/raftalin could be used as a fat replacer as well as a source of fiber in low fat ice cream. Polydextrose, which is also a carbohydrate based fat replacer, could be another economical source of fiber incorporation in ice cream.

Conclusion

Sporadic efforts vis-à-vis development of low fat, fiber enriched Ice cream has been taking place in some of the countries including USA and Greece. In our country also some attempts being made in this direction, at some of the premier research institutes, especially at National Dairy Research Institute, Karnal, wherein the author of this paper is also contributing whole-heartedly, in this pioneer endeavour; Presently a good attempt has been made by some organized dairies viz Mother Dairy and Amul which are entering in this arena; and, this itself is an indication of scope of entrepreneurship in this area. A concentrated effort in this direction has, therefore, to be made, in order to achieve the desired goal.

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Fiber Fortification of Dairy Products

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Milk is Marvellous

There is no denying the fact that milk in human diet is unsurpassed by any other food. Its nutritional virtues are remarkable by any standards. It is rightly considered to be a ‘nearly complete food’. However, with rapidly changing lifestyle in opulent countries as also in most of the urban and even certain prosperous rural areas of countries like India, the diet has become much of a concern for health. In this regard, the sedentary ways of life has greatly contributed to the association of heart and other related ailments with saturated fat and cholesterol in the diet. Obviously, therefore, milk and milk products come under the cloud on account of this suspected role in coronary heart disease.

Another, diet and health related issue is the ‘low-residue’ nature of milk and most dairy products attributable to the absence of dietary fiber in them. This attribute of milk becomes particularly relevant when the overall diet does not contain adequate amounts of dietary fiber as, again, is the case in much of the wealthy populations. In this context, then, milk and milk products considered as a vehicle for dietary fiber would not only take care of their own role in human health but could also enhance the healthfulness of the diet as a whole. Incorporation of dietary fiber in milk could do much to negate the adverse publicity that is often given to this otherwise ‘benign’ commodity. The health-promoting attributes of dietary fiber and possibilities of enriching milk and milk products with it are discussed in the following paragraphs.

What is Dietary Fiber?

More than three decades back when the significance of dietary fiber was first realized, it was defined as “the remnants of edible plant cells including polysaccharides, lignin, and associated substances that are resistant to digestion in the alimentary tract of humans”. It was thus referred to as a macro-constituent of foods, which includes cellulose, hemicellulose, lignin, gums, modified cellulose, mucilages, oligosaccharides, and pectin and associated minor substances such as waxes, cutin and suberin. Later, the definition was widened to include all indigestible polysaccharides. Thus, the AACC (American Association of Cereal Chemists) definition came to be widely accepted which defines “dietary fiber is the remnants of the edible parts of plants or analogous carbohydrates that are resistant to digestion and absorption in the human small intestine with complete or partial fermentation in the large intestine. It includes polysaccharides, oligosaccharides, lignin, and associated plant substances. Dietary fiber exhibits one or more of laxation (fecal bulking and softening: increased frequency and/or regularity), blood cholesterol attenuation, and blood glucose attenuation.” The term ‘analogous carbohydrates’ mentioned here is defined as those materials, not necessarily intrinsic to a part of a plant as consumed, that exhibit the digestion and fermentation properties of fiber. These are produced during food processing, by chemical and/or physical processes affecting the digestibility of starches, or by purposeful synthesis. Oligosaccharides include fructan, neosugar, raffinose, stachyose, 4′-galactosyl-lactose, 6′-galactosyl-lactose, xylo-oligosaccharide, maltitol, lactitol, palatinit, lactulose, oligofructose and inulin while associated plant substances include phytate, lectins, non-polymeric polyphenols. The desirable daily intake of dietary fiber is 25g for persons consuming 2,000 cal daily and 30g per day for those consuming 2,500 cal. WHO recommends 16-24g/day of...
How is Dietary Fiber Beneficial in Human Health?

In 1970, Burkitt, Painter and Trowell of the USA observed that the rural Africans with their fiber-rich diet did not have many of the diseases that plagued the west where the fiber in diet was much less. They theorized that the high fiber diet not only exerted positive effects on the gut directly but had many other systemic effects as well. Thus, fiber was launched from merely being ‘roughage’ to a substance with many possible therapeutic and preventive roles in human health. Inadequate intake of dietary fiber can increase the risk of constipation, bowel irregularities, hemorrhoids (a disease characterized by swollen veins in the wall of the anus), and diverticulosis (disease causing small pockets or out-pouchings to occur in the bowel). Lack of sufficient dietary fiber can lead to numerous negative consequences in overall body health. Lack of fiber in the diet has been found to relate to the occurrence of such common disorders as ischemic heart disease (deficiency of blood supply to the heart), appendicitis, gall bladder disease, varicose veins (permanently and abnormally dilated veins), deep vein thrombosis (coagulation of the blood in a blood-vessel), hiatus hernia (a state of protrusion of part of an organ through the wall of the body cavity containing it), and tumors of the large bowel (or colorectal cancer). Inclusion of fiber in the diet has been associated with decreased bowel transit times, increased stool weight and reduced serum cholesterol.

The physiological attributes of dietary fiber depends on their physical characteristics namely the molecular design and solubility in water to form a gel of high viscosity. Dietary fibers, both soluble and insoluble, have β-1-4 covalent bonds. The human digestive enzymes cannot cleave β linkages and only can cleave the α linkages. The physiological role of dietary fiber is that it adds to the bulk of the diet helping in easy transit of the food in the gastro-intestinal tract. Reduced transit time promotes regularity and minimizes risk of colon cancer by decreasing the time that colonocytes are exposed to potentially carcinogenic wastes. It holds water and in turn, softens the stools for easy excretion. The protective effect of dietary fiber against cancer was attributed to, the diluting effect of bulky stools (from a high-fiber diet) on concentration of carcinogens in the tract derived from the diet or formed by bacterial metabolism from unabsorbed dietary components such as bile acids, and to the reduced contact time with the intestinal mucosa owing to more rapid stool transit.

Fiber-Rich Foods

High-fiber foods include fruits, vegetables, whole grains, and legumes. These provide pectin, hemicellulose, cellulose and lignin. Pectin and hemicellulose are generally considered soluble fiber, have higher water-holding capacity, form gels in the intestines, and are in higher quantities in fruits, vegetables and legumes. Insoluble fibers, cellulose and lignin, are not water-soluble, have a lower water-holding capacity and are derived from the tougher structural components of plants. The dietary fiber content of fruits and vegetables ranges from 0.5g/100g for fresh watermelon to 10.3g/100g for fresh passion fruit and 10.9g/100g for sapota (chiku). Fruits like dates, prunes, raspberries, guavas, gooseberries, cranberries and raisins are moderately rich in dietary fiber while among vegetables, brinjal, amaranth, bittergourd and broccoli are good sources of dietary fiber. Among legumes, soybeans and green peas are quite rich in dietary fiber. Although root crops have generally been branded as ‘poor man’s crops’ supplying low cost energy and bulk to the diet, their potential as nutritionally rich sources of beta-carotene, anti-oxidants, dietary fiber and minerals like calcium has begun to be recognized worldwide. Sweet potatoes and yams are moderately rich in dietary fiber.
Dried fruits, nuts and seeds are rich in dietary fiber, especially poppy seeds, mustard seeds, flax seeds and sunflower seeds among seeds; and almonds, chestnuts, pistachio nuts and coconut among dried fruits and nuts. Out of the total dietary fiber content, insoluble fiber is far more than the soluble fiber. Cereals as whole grains or their brans as a separate entity are rich in dietary fiber. Food gums, the concentrated source of dietary fiber, are the complex polysaccharides, containing several different sugar molecules and uronic acid groups. Gum acacia, gum tragacanth, gum karaya and gum ghatti are the exudates of various plants obtained when the bark is cut or the plant is otherwise injured. While guar gum and carob (locust) bean gum are examples of gums derived from seeds, gum xanthan is produced by the microorganism Xanthomonas campestris.

Fiber in Dairy Foods

While most dairy products do not contain dietary fiber, there are a few dairy foods, which contain certain non-dairy ingredients contributing varying amounts of fiber. Fruit – containing products such as yoghurt, ice cream, custard, etc. are well-known examples of such foods. Also, dietary fiber can be incorporated into the diet as purified fiber or in the form of a fiber-rich source. Purified dietary fiber may be in the form of pure cellulose, hemicellulose, xylan, raffinose, pectin, guar gum, sodium alginate, carrageenan, carob bean gum, ispaghula husk, inulin, resistant starch, or their mixtures, while fiber rich sources may include wheat bran, corn bran, oat bran, sorghum meal, barley hulls, barley husk, soybean hulls, lipin hulls, pea hulls, canola hulls, fruits and vegetables. There are several international companies which manufacture and supply dietary fiber preparations e.g., Pro-fibre Nutrition (U.K.) manufactures Fibre-Hi, Golden Jersey Products Inc. (U.S.A.) supplies Oatrim, Nutrasweet Kelco Co., (California) offers Primacel, Benelux Firm Benuline, (Netherlands) has Fibruline-R, Grindsted products (Denmark) manufactures carrageenan, while Meer Corporation of New Zealand sells Merecol. Cellulose and marine colloids are manufactured by FMC Corporation, Philadelphia. Also, ID Foods (France) manufactures Soluline IDA and ID Tex, while Crispy Food International (Denmark) supplies a Fiber topping. In India, soluble fiber inulin is available from S.A. Pharmachem, Mumbai, Polydextrose is supplied by Danisco, whereas wheat, oat- , and several other fiber preparations are offered by Clarico-FPC, Mumbai.

Fiber - rich Ingredients in Dairy Foods

Added vegetables can add variety as well as dietary fiber to the dairy products. Sweetpotato yoghurt and yam yoghurt have recently been reported as novel health-providing dairy foods. In India, people are familiar with various regional traditional dairy products, which contain added vegetables. Various non-dairy ingredients including vegetables such as boiled and dried potatoes, raw onion pieces, raw cucumber, tomatoes, carrot, pumpkin, ginger, grated coconut and roasted cumin seeds or fried mustards seeds, banana or mango pieces, fried besan (bengal gram flour) or moong dal flour granules or fried lady finger have been reported to be added to well beaten and spiced dahi, commonly known as raita. Kadhi is another prominent Indian culinary item, which contains non-dairy ingredients such as bengal gram flour (besan) stirred into dahi or buttermilk in addition to boiled vegetables, salted and sautéed onions and sometimes also fried-balls of spiced besan batter (pakora). Carrot-based Gajar- ka-halwa, Lauki kheer (Bottlegourd kheer) or Doodhi Halwa, are among other Indian dairy delicacies which contain dietary fiber. Fruit and nut ice cream, which may contain strawberry, apricot, pineapple, mango, banana etc. and/or nuts such as almonds, pistachio, walnuts and cashewnuts are valued for their palatability. Fruits are also reported to reduce the harsh acidity and off-flavours, if any, present in yoghurt. They can be added to yoghurt either before yoghurt setting (fruit-on-bottom yoghurt) or to stirred yoghurt (bulk-mixed fruit yoghurt). In a recent study, yoghurt with raisins, peanuts and coconuts was liked ‘very
much’ by 90% of old respondents and 87% of adults, but 90% of adults showed such high preference for yoghurt with only raisins and peanuts. Eighty-two per cent of adults liked strawberry yoghurt ‘very much’. These acceptability ratings were considerably higher than those for yoghurt containing vegetables such as cucumber and celery. These results showed that vegetable yoghurt was less acceptable than the fruit yoghurt. Several varieties of Shrikhand, a popular sweetish-sour fermented milk product of Gujarat and Maharashtra, are reported to be prepared by adding pulp of certain fruits such as mango, banana, papaya and nuts to chakka. Burfi is another popular traditional milk sweet prepared with cashewnut (known as kaju - katri / katli), almond, pistachio, coconut, etc.

The chemical structure and the physico-chemical properties are both thought to determine the functional properties of dietary fiber. Starch as a complex carbohydrate is a good source of dietary fiber depending on processing and storage. Indigestible dextrin, prepared by heat treatment of corn starch has found suitable for incorporation into products like milk shakes, ice creams, yoghurt, dried cheese and cream cheese to serve as dietary fiber in the products. A frozen breakfast food containing fluid milk infused into grains such as rice, wheat, oats or mixtures of the three has been developed by Healthy Grain Foods (USA).

Several traditional Indian dairy products contain various cereal and legume as ingredients. Kheer and Payasam are prepared using rice, sevian (vermicelli), makhana (lotus puffs), sago (tapioca starch) and nuts (almonds, pistachio and cashewnuts). Payasam may also contain vermicelli, kaddu (pumpkin), poppy seeds (khus-khus), bengal gram dal, green gram dal, beaten rice, suji, cooked rice dough (ada), mango and jack fruit. Another Indian dairy product Doda barfi, made from germinated-wheat flour (angoori atta) is an excellent source of dietary fiber. The product is characterized by pleasant caramelized flavour, dark brown colour and chewy and grainy body. Sohan halwa is another germinated-wheat-based buffalo milk product, popular in North India. It has an extremely chewy texture, which is attributed to the simultaneous presence of wheat gluten and casein. Also, ghevar, a milk sweet prepared from admixture of wheat flour, is a rare delicacy of Rajasthan. Its body has a characteristic miniaturized honey comb structure that is spongy and chewy with sugar layer on top providing a glossy appearance. Falooda is a milk-based drink, flavoured with rose syrup and added with strands of corn flour vermicelli. The whole corn flour and the toppings containing cherries or dried papaya contribute to its dietary fiber content. Makkhan bada (padusha) is a fried South Indian sweet, consisting of maize or wheat flour, dahi, ghee and milk, the last being used as a kneading medium. Similarly, another South Indian khoa-based sweet dish containing fried gram flour and cashewnuts as base is Mohandas. Such combinations of milk and milk products with non-dairy ingredients enable the manufacturers as well as the consumers to choose from the variety of innovated fiber fortified products that will provide health attributes along with savour.

Commercial Fiber Preparations in Dairy Products

Commercially available fiber preparations are either insoluble type or soluble type. Use of insoluble fiber preparations has been rather limited in the dairy products. Examples include yoghurt containing wheat bran. Wheat bran has been found not to impair growth of Streptococcus thermophilus and appears to have positive effects on the growth of Lactobacillus bulgaricus in the incubation phase. Wheat bran after extrusion (high pressure and high temperature treatment) could also be added to yoghurt or quarg specialities to enhance its fiber content. Yoghurt added with commercial fibers from apple, wheat, bamboo as well as inulin has also been reported. Yoghurt fortified with inulin scored highest for flavour attributes while the yoghurt with wheat fiber scored highest for textural attributes followed by yoghurt...
with bamboo fiber. The research work regarding the fortification of some selected dairy foods like kheer and yoghurt with the commercial fiber preparations and their blends is under progress in dairy technology division, NDRI.

Several soluble fiber preparations are nowadays gaining popularity as a fiber ingredient for various dairy products for their several physiological and functional roles. A dietetic yoghurt containing inulin has been found to promote the growth of healthy gastrointestinal microflora. Short chain fructooligosaccharides of two to four fructose units have been claimed to be particularly suitable for incorporation into dairy products to improve the taste and texture of the product as well as to serve as bifidogenic factor to improve the intestinal health of the consumers. Inulin or oligofructose has found most useful for use in dairy products such as flavoured milk, milk drinks, fermented milk, cheeses, desserts and ice cream, as well as paneer. Addition of fermentable fiber to the milk formula has been reported to be a cost-effective way to reduce the severity of pathogenic infection-associated symptoms in infants.

Also, the soluble fibers are known to improve the body-texture and viscosity of the product without any addition of calories to the product. Due to their low calorific value, polydextrose, maltodextrin and pea fibers have been used as a fat substitute at the rate of 1.5 per cent in yoghurt. These fat substitutes were reported to affect the viscosity of yoghurt but did not alter the activity of the starter culture. Yoghurt with polydextrose scored well for the flavour and aroma attributes than did pea fiber but the yoghurt with pea fiber, P-fiber 150C had shown the least whey syneresis. Polyfructan, another soluble dietary fiber, can also be used as a low-energy bulking agent for sweeteners, viz., aspartame, or as a fat substitute in ice cream and baked cheese cakes.

Various gums from both plant and microbial sources are used in dairy industry as thickening agents, emulsifiers, and emulsion stabilizers, or to modify the structure of the product. They are able to modify fat and water-holding properties and can also control aroma and flavour release. Psyllium husk (isabgul) and gum acacia was found to be suitable as stabilizers in ice cream which gave ice cream a highly acceptable body and texture. Locust bean gum has found use in cheese and ice cream. In the former it is added to increase the yield of curd solids by 10 per cent, while in the latter it stabilizes the system and binds water allowing ice cream to withstand heat shock during storage and to melt smoothly in the mouth. It is also suitable in low-calorie milk-based salad dressings where an interactive role of gum, milk and acetic acid concentrations on emulsion consistency has been found. Carrageenan, guar gum and sodium carboxymethyl cellulose have been extensively used at low concentrations in ice cream to prevent large ice crystal formation. Carrageenan complexes with milk proteins and prevents wheying-off. Carrageenan, sodium alginate, guar gum, and carboxymethyl cellulose have also been reported to be used as thickeners in the stabilization of whey-based tomato soups. It should, however, be noted that the use of such gums as thickeners is generally at so low levels that the fiber intake through such food would be rather limited.

Soytrim, a soluble fiber preparation obtained by the thermomechanical processing of soybean and oat products, has been used in some Asian foods. Various Asian foods standardized with added Soytrim include Thai green chicken curry, fermented soybean sauce (dip), Mungbean conserve and sweetened condensed cassava paste. These products were enriched in soluble fiber and had reduced saturated fat content. Similarly, Oatrim, a product obtained by treating the oat flour with a food-grade enzyme, such that it contained b-glucan, a soluble fiber and amylopectin, was successfully used in skim milk to overcome the watery appearance and bland mouthfeel and to add to it a cholesterol-lowering property. The standardized fat-free milk with added Oatrim was claimed to provide 0.8g dietary fiber per 240 ml serving.
Similar to the Soytrim mentioned above, various fiber blends are commercially available which can be consumed with milk, for example, Merecol or Sat-Isabgol, both are psyllium husk preparations. Another such product is “Nu-Riceutical”, developed to deliver the nutritional and functional properties of rice bran for use in tablet-style supplements or an ingredient in fortified foods.

**Conclusion**

Literature is replete with the scientific evidence supporting the beneficial effects of fiber-rich diet. It is therefore common that doctors and nutritionists advise people to increase their intake of dietary fiber by increasing the consumption of whole grains, legumes, vegetables and fruits. Certain commercial fiber supplements have also been shown to be beneficial in the treatment of specific health problems. Physicians often recommend fiber supplements for patients with chronic constipation. Various dietary fibers have been shown in clinical studies to play an important role in reducing plasma cholesterol, improving bowel microflora and bowel function, decreasing the risks of colon and other cancers and sometimes even reducing blood sugar. Hence, dietary fiber preparations have attained a great commercial significance as nutraceuticals with considerable functional relevance in the diet in general and milk products in particular. Although a few milk products do contain dietary fiber added through fruit and vegetable ingredients, commercial fiber preparations used as non-conventional ingredients in various dairy products have a great potential to enhance their physical and physiological functionality. The single most important role that these nutraceuticals can play is to improve the sagging image of milk products on account of their saturated fat and cholesterol content. Dairy food formulations with added dietary fiber can transform the usually ‘low-residue’ milk constituents, collectively, into dietary products with their well established nutritional superiority and added healthfulness. Thus, native functional virtues of milk such as conjugated linolenic acid, certain biopeptides, whey proteins, sphingolipids etc. added with the fiber functionality would greatly elevate the status of dairy products for the benefit of consumers of all age groups.
Entrepreneurship Development in Dairy Sector

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National Dairy Research Institute, Karnal-132001 (Haryana)

The human resources are one of the most strategic and critical determinants of growth. But the human resources alone will not produce economic development. There must be dynamic entrepreneurs or that to happen. The spirit of Entrepreneurship Development is quite old. Agriculture as well as dairying could play a more constructive role in promoting rural welfare and reducing poverty by generating employment at farm level.

Concept of Entrepreneur

An entrepreneur is basically an innovator who introduces something new into the economy. He/ she is a person who is capable of taking investment decisions, calculated risks under conditions of uncertainty can plan and innovate, take prompt and wise decisions in selecting a product or product mix and marketing.

An entrepreneur is a dynamic change agent or catalyst who is able to create an improved situation. In fact, he is the key person who is responsible for setting up a new business or an enterprise, and strives to maximize the profit by adopting innovations.

Dairying as Potential Enterprise

The SWOT (strengths, weaknesses, opportunities and threats) analysis is essential for identifying the potentiality of dairying as a profitable enterprise.

Strengths

- Demand- profile of the particular agri-product.
- Improved purchasing power of consumer.
- Availability of milk.
- Technological back-up.
- Dairy plants

Weaknesses

- Lack of control over yield.
- Lack of storage facility/ perishability.
- Market competition.
- Problematic procurement and distribution.

Opportunities

- Value addition
- Export potential

Threats

- Unorganized sector and the milk vendors
Traits of Dairy Entrepreneurs

There is an age-old saying: “Failure is never final and success is never ending”. That means, to be a successful entrepreneur a person has to develop certain qualities via training and motivation: and those essential traits could be:

- High achievement motivation.
- Risk taking ability and dealing with failure.
- Goal setting (something new or innovative spirit).
- Self-control and self-confidence and hard-working.
- Time management, regularity and dedication to work.
- Technical background and experience in the line.
- Willing to take advice and use of feedback.
- Manageability and pursuability.
- Total commitment and immersion.

Role of Dairy Cooperatives for Successful Entrepreneurship Development

Milk cooperatives are autonomous organizations of persons united voluntarily to meet their common, economic, social and cultural needs/aspirations through jointly-owned and democratically-controlled enterprises.

The world milk market has undergone a sea change over the last decade. So, it is the time to capitalize on this opportunity. We have to produce clean milk and we have to maintain the hygienic standards. Besides, market orientation and innovative diversification of products are also needed. In addition, world-class packaging, vigorous promotional campaign and latest modes of transport suited specially for carriage of milk and milk product happen to be very much essential.

Dairy cooperatives are having greater contribution in clean milk production, distribution, marketing etc. Thus, these cooperatives help in increasing income and employment through developing entrepreneurship in this sector. So, dairy cooperatives can play a vital role in creating opportunities of entrepreneurship in the field of dairying.

Conclusion

The success of dairy-enterprise depends on factors, such as, an efficient yet economical procurement network, hygienic and cost-effective processing facilities and innovativeness in market place. For that, training should be imparted to the entrepreneurs; financial facilities should also be provided; micro-level planning is also needed; and central and state governments should place more emphasis on untouched areas, create awareness among educated and uneducated unemployed youth about the availability of facilities and concessions for entrepreneurs. Thus, successful dairy entrepreneurship will develop.
Entrepreneurship Development Among Small Scale Dairy Owners of Haryana - A Market Research

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*Scientist (S.G.), **Sr.Scientist and ***Principal Scientist
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The word entrepreneur originates from the French word, 'enterprendre', which means, "to undertake". In business context, it means to start business. Most common dictionary meaning of entrepreneur is the one who organizes, manages and assumes the risks of a business. The concept of entrepreneurship has a wide range of meanings, on the one extreme an entrepreneur is a person of very high aptitude who pioneers change and on the other extreme any one who wants to work for himself or herself is considered to be an entrepreneur.

It has been observed that in most districts of the States of Haryana, and Punjab a large number of small dairy entrepreneurs handle sizeable quantity of fluid milk each day in processing various indigenous dairy products and are in dairy business without having any sound knowledge and skills of handling milk scientifically.

It is required that they be trained so that they can add value to their milk by processing and marketing their own products viz., cheese, butter, curd, khoa, ice cream, and flavoured milk. As many consumers are willing to pay a premium for locally produced, high-quality dairy products so in coming times the small scale dairy processing entrepreneurs would have sizeable consumer population to whom they will be required to provide quality dairy products.

To investigate all these issues related to the small scale dairy processing entrepreneurs a study was undertaken in the Haryana state to ascertain the various methodologies prevalent for manufacturing various dairy products and the perception of the small scale dairy processing entrepreneurs towards the selected dairy technologies developed by the Dairy Technology (D.T.) Division of the National Dairy Research Institute (N.D.R.I.), Karnal.

Present study was conducted in the three districts of Haryana State namely Rohtak, Karnal and Yamunanagar. Data pertaining to prevalent dairy technologies was collected from a total of sixty selected small scale dairy processing entrepreneurs and their differential training needs were then ascertained. Based on the identified training needs, training and pilot level testing of the dairy processing technologies were carried out and feedback information ascertained.

To demonstrate the dairy processing technologies amongst the selected respondents, information pertaining to dairy processing technologies developed by the Dairy Technology (DT) Division was obtained from the secondary sources and documented. Based on the relevance of the technologies for usage amongst different clientele namely, sweet shop owners and small-scale dairy entrepreneurs the delineation was done (Table I). Manufacturing practices followed by the small -scale dairy owners for separation of cream from milk and preparation of Butter, Ghee, Channa, Khoa and Curd were documented.

All the entrepreneurs had equipments and required only chemicals for ascertaining the levels of fat and SNF in milk whereas, only 8.33 per cent of the total respondents had training in determination of these milk constituents. Majority of them had cream separator, deep freezers and heating devices where as only 5 per cent had mechanized system of khoa making. In Karnal district, 5 per cent of the selected respondents were also engaged in manufacturing ice cream, whereas 40 percent of the respondents having small-scale dairy units were engaged in only paneer making in the Rohtak district.
### Table: 1 List of Technologies Developed for the Manufacture of Different Dairy Products by Dairy Technology Division, NDRI

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Technologies</th>
<th>Technologies Relevant to different clientele</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SSDE</td>
</tr>
<tr>
<td>1.</td>
<td>Milk Shake Mix Powder</td>
<td>X</td>
</tr>
<tr>
<td>2.</td>
<td>Gulab Jamun Mix Powder</td>
<td>X</td>
</tr>
<tr>
<td>3.</td>
<td>Sterilized Cream</td>
<td>X</td>
</tr>
<tr>
<td>4.</td>
<td>Lassi</td>
<td>✔</td>
</tr>
<tr>
<td>5.</td>
<td>Khoa Powder</td>
<td>X</td>
</tr>
<tr>
<td>6.</td>
<td>Manufacturing of Yoghurt</td>
<td>✔</td>
</tr>
<tr>
<td>7.</td>
<td>Resogolla Mix Powder</td>
<td>X</td>
</tr>
<tr>
<td>8.</td>
<td>Instant Kheer Mix</td>
<td>X</td>
</tr>
<tr>
<td>9.</td>
<td>Acidophilus Milk</td>
<td>✔</td>
</tr>
<tr>
<td>10.</td>
<td>Dahi from Sweet Cream Butter Milk/Misti Dahi</td>
<td>✔</td>
</tr>
<tr>
<td>11.</td>
<td>Acido-whey Soft Drink</td>
<td>✔</td>
</tr>
<tr>
<td>12.</td>
<td>Shrikhand</td>
<td>✔</td>
</tr>
<tr>
<td>13.</td>
<td>Paneer</td>
<td>✔</td>
</tr>
<tr>
<td>14.</td>
<td>Chhana Making</td>
<td>✔</td>
</tr>
<tr>
<td>15.</td>
<td>Sandesh</td>
<td>✔</td>
</tr>
<tr>
<td>16.</td>
<td>Packaging of Khoa and Chhana</td>
<td>✔</td>
</tr>
<tr>
<td>17.</td>
<td>Sweet Cheese</td>
<td>✔</td>
</tr>
<tr>
<td>18.</td>
<td>Surti Cheese</td>
<td>✔</td>
</tr>
<tr>
<td>19.</td>
<td>Ricotta Cheese</td>
<td>✔</td>
</tr>
<tr>
<td>20.</td>
<td>Mozzarella Cheese</td>
<td>✔</td>
</tr>
<tr>
<td>21.</td>
<td>Gouda Cheese from Buffalo Milk</td>
<td>✔</td>
</tr>
<tr>
<td>22.</td>
<td>Swiss Cheese</td>
<td>✔</td>
</tr>
<tr>
<td>23.</td>
<td>Increasing the Shelf-life of Ghee</td>
<td>✔</td>
</tr>
<tr>
<td>24.</td>
<td>Low Fat Spreads</td>
<td>✔</td>
</tr>
<tr>
<td>25.</td>
<td>Coffee Complete</td>
<td>X</td>
</tr>
<tr>
<td>26.</td>
<td>Mango Milk Powder</td>
<td>X</td>
</tr>
<tr>
<td>27.</td>
<td>Whey Protein Concentrate</td>
<td>X</td>
</tr>
<tr>
<td>28.</td>
<td>Whey Powder</td>
<td>X</td>
</tr>
<tr>
<td>29.</td>
<td>Low Lactose Powder</td>
<td>X</td>
</tr>
<tr>
<td>30.</td>
<td>Soft Serve Ice-Cream From Soyabean and Butter Milk</td>
<td>✔</td>
</tr>
<tr>
<td>31.</td>
<td>Accelerated Ripening of Cheese</td>
<td>✔</td>
</tr>
<tr>
<td>32.</td>
<td>Cheddar Cheese from Cow Milk</td>
<td>X</td>
</tr>
<tr>
<td>33.</td>
<td>Cheddar Cheese from Buffalo Milk</td>
<td>X</td>
</tr>
<tr>
<td>34.</td>
<td>Cottage Cheese</td>
<td>X</td>
</tr>
<tr>
<td>35.</td>
<td>Processed cheese</td>
<td>X</td>
</tr>
<tr>
<td>36.</td>
<td>Commercial Production and Burfi</td>
<td>✔</td>
</tr>
<tr>
<td>37.</td>
<td>Cheese spread Powder</td>
<td>X</td>
</tr>
<tr>
<td>38.</td>
<td>Dried Channa</td>
<td>X</td>
</tr>
</tbody>
</table>

✔ = Technologies applicable for specific client
X = Technologies applicable for dairy industry
SSDE = Small-Scale Dairy Entrepreneurs,
SSO = Sweet Shop Owners
Majority of the small-scale dairy owners were interested in undergoing training in aspects related to the manufacture of paneer, and ghee. They were also interested in getting trained in methods for estimation of fat and SNF in milk so that their ratio could be judiciously used for improving the quality and yield of Paneer. It was noted that only 20 percent of small-scale dairy owners from Karnal and 15 percent from Yamunanagar were using citric acid as the coagulant. Out of the total respondents, 6.66 percent were using acetic acid as the coagulating agent for paneer making. Majority of them were using traditional method for the manufacture of paneer in which recycled whey was used for coagulating the milk.

Amongst all the selected respondents of Rohtak district used skim milk and colostrums for making paneer and the cost of production of this type of paneer was around rupees 27 per kilogram. Everyday 11 to 32 quintals of paneer was manufactured using this method, as it was dependent upon the availability of colostrum, which was brought to Rohtak market from various surrounding villages. This type of paneer is sold at varying prices ranging from rupees 40-60 per Kg in various districts of Haryana and at times in Delhi and Punjab.

The paneer and channa making technologies developed by NDRI were demonstrated to the small-scale dairy owners. The products were ‘liked extremely’ by majority of the respondents on 9-point hedonic scale. Ten percent of the respondents of Karnal district however rated the product made using NDRI technology as less white and slightly tough in texture. Small scale dairy owners were particularly concerned about the higher sale price of paneer made using NDRI technology vis-à-vis cheaper products being sold in the local market.

Majority of the respondents were not aware of the technologies available for the manufacture of acido-whey soft drink, acidophilus milk, sweet and surti cheese or the packaging of Khao and Chhana. However 30 per cent of the total respondents were interested to undergo training in technologies for the manufacture of acido-whey and Mozzarella Cheese.

In the present study, it was concluded that majority of the small scale dairy processing entrepreneurs were using traditional know how for manufacturing dairy products. As a large number of such small scale dairy processing units are coming up in the urban areas of Haryana state, it is essential that the small entrepreneurs are trained on scientific lines for manufacturing various quality dairy products so that the consumers get quality products commensurate with the price they pay. Economists and policymakers have identified such “entrepreneurs” as important innovative drivers for generating employment and economic growth. Therefore it is required that similar studies are taken up in different states and data bank created to take stock of the situation with regard to milk being handled by this sector of the dairy industry. Such an attempt would help in identifying the critical gaps necessary for new policy initiatives to redress the problems, which will go a long way in promoting the future prospects of these small scale dairy processing entrepreneurs and the consumers in various states of the country.

References:
Production and Promotion of Traditional Fermented Dairy Products – A Challenge before the Small Scale Entrepreneur

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The impact of the role of technology in development is being recognized more and more as time progresses. In this era of globalisation, new technologies are rapidly reshaping the livelihoods and lifestyles of people throughout the world. Knowledge and communications-based industries are rewriting the global economy, causing a ‘knowledge divide’ between the information-rich and the information-poor regions of the world.

It has been well-documented that simple changes in technology can often increase productivity and conserve resources by incorporating elements of traditional knowledge and modern science. However, small-scale businesses find it increasingly difficult to compete with bigger - often multinational - companies under liberalised trade regimes. Many companies from traditionally wealthy parts of the world have benefited from subsidies and protection that many poorer countries and producers have either been denied or lost.

Ironically, even on a more individual basis, it is not recognised widely enough that the small-scale entrepreneurs are able to innovate themselves. Their creativity, thinking and potential solutions are often not supported. They need good information about market opportunities and support to upgrade their technologies to access local, regional or international markets on favourable terms.

Opportunities for fermented food products in developing countries

Fermentation is one of the oldest forms of food preservation technologies in the world. It is a relatively efficient, low-energy preservation process which increases the shelf life and decreases the need for refrigeration or other form of food preservation technology. It is, therefore, a highly appropriate technique for use in developing countries and remote areas where access to sophisticated equipment is limited. Indigenous fermented foods such as bread, cheese and wine, have been prepared and consumed for thousands of years. Fermented dairy products such as dahi of India find mention in her ancient scriptures and are strongly linked to culture and tradition.

Although there are several options for preserving fresh produce including drying, freezing and canning, many of these are inappropriate for use on the small scale in developing countries. For instance, small scale canning is usually not economically feasible and has serious food safety implications. Fermentation requires very little sophisticated equipment, either to carry out the fermentation or for subsequent storage of the fermented product.

Development of a successful enterprise

The success of any new food product on the market depends on the ability of this product to meet the needs, tastes and requirements of the target consumer. The development of a small-scale processing business is a long and painful voyage. There are several hurdles that the entrepreneur has to cross on his way to success, as the risks are abundant. The entrepreneur has to deal with a lot of emotional and psychological pressure, besides attempting to gather all the material things his business needs to succeed. How to run a small business successfully needs assessment, conducting market feasibility studies, preparing business plans, keeping accounts etc., besides having a sound knowledge of the product characteristics.
The major issues to be addressed before starting a business are listed below:

1. **Finances**

   Money is the lifeline behind any business. While there is universal acceptance that small businesses have the potential to solve employment problems in many countries, there is not enough attention and support provided for the development and sustenance of such businesses. As it is virtually impossible to save money from employment earnings to finance a new business adequately, a loan from a credit organization is essential. It is, therefore imperative that the prospective entrepreneur researches well into the probable lending institutions, their interest rates and credibility.

2. **Location**

   The industry must be located where there is an advantage for raw material procurement or there is a large market support. The costs of transporting raw materials or the finished products to the market can adversely affect the viability of the business. It is also necessary that the required services such as power, water and manpower are easily and plentifully available.

3. **Building and premises**

   Acquiring suitable building and premises is a challenge to many a new entrepreneur. It is not advisable to lease properties that have been built for other specific business activities. These are, in the majority of cases not suitable for dairy processing purposes, thus resulting in low productivity. The production costs increase and the competitive advantage get lost. Therefore, it is always better to design the premises as per one’s specific requirements, provided finances permit.

4. **Personnel**

   The selection and engagement of personnel must be based on a sound selection process. The job description must be the top priority, with the applicant adequately fitting the position. It is advisable to avoid pressure from acquaintances and relatives to employ their candidates. Although it may appear that immediate savings will result, in the long term, the productivity level may be drastically lowered.

5. **Raw materials**

   The sourcing of good quality milk in sufficient quantities to support uninterrupted production schedules is another big challenge. As milk production is seasonal, the summer months are lean and the winter months are flush with adequate quantities. However, for sustainability, production levels have to be fairly uniform, whatever the season. The long-established and large dairy processors have the financial resources and structures that enable them to manage the situation in the lean season. However, the small-scale processor is at a disadvantage if he has no adequate funds to see him through times of shortage.

6. **Product quality**

   The maintenance of quality is very essential for the success of the enterprise. Any errors that occur which leave a customer unhappy or even cause them to complain, will damage the business. Establishing good appropriate quality management systems cost money. Many small enterprises unfortunately see these costs as either a burden or a luxury. However, the expenditure should be seen as a routine business cost and no different from any other essential expenditure, because if the customer is not satisfied, the business will fail. Quality control
consists of carrying out checks at various points in the manufacturing system, for instance, net weight, acidity, colour and chemical characteristics. It deals with particular points in the whole process at which specific checks are made. On the other hand, quality assurance looks at the whole process – from the purchase of materials, through the manufacturing process, to the point at which the consumer uses the food. It is a management tool which includes quality control.

7. Packaging

The presentation of a product is most essential in today’s world of consumerism. A product can succeed or fail because of its packaging. Once again, the issue of finances looms large here. An entrepreneur may have to order in large quantities for cash payment in order to obtain competitively priced packaging material. Normally suppliers of packaging materials only begin to give discount after several consignments have been ordered on a regular basis.

8. Marketing

The most important and difficult thing in a business is to satisfy a customer. Therefore, selling the first production batches is not easy. The customers will subject the products to all sorts of tests. They also tend to develop preferences for particular brands and need a lot of persuasion to change. Deciding the pricing of the product is another challenge. Price plays an important role in determining how the product performs. If it is too low, customers may perceive the quality as inferior. If it is high, it may cause hurdles in terms of inadequate buying power and also skepticism about the product. A third factor is the level of advertisement and promotion to back the product and its cost.

Documentation of traditional processes

Fermented dairy products have been known for thousands of years. These products are often appropriate to the technical, social and economic conditions of the region in which they are made. However, these traditional products are now facing severe competition from mass-produced products. There is a danger that with globalization these traditional foods will disappear. Small scale fermentation technologies, such as those in use in developing countries have been largely neglected. It is likely that the microbial and enzymatic processes responsible for these transformations are still relatively unknown.

Although the basic principles of fermentation technology no doubt apply to these products, subtle differences in the microorganisms present, the raw materials and the fermentation conditions are responsible for the diverse range and individual tastes and textures of products which are formed. Because of the tremendously important role indigenous fermented foods play in food preservation and their potential to contribute to improved nutrition, it is imperative that the knowledge of their production is not lost. There is a need for research to address these issues and encourage individuals to collect and document the traditional fermented dairy foods native to their own region and diet.
Entrepreneurship: A Key Link for Success in Industry

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INTRODUCTION

Diversity of approaches to the study of “entrepreneurship” (pronounced as “On-tray-preneurship” ... and, not as “En-ter-preneurship”!). However, in our country, unfortunately, majority of the people pronounce this word as the latter one!!) has made it difficult to have a “clear-cut definition of this concept. For example, Webster's New American Dictionary defines “entrepreneur: as : “One who undertakes an enterprise” or “an employer of workmen”. On the other hand, Webster's Third International Dictionary offers a more detailed definition of the term “entrepreneur”: “an organizer of an economic venture, especially one who organizes, owns, manages, and assumes the risk of a business”. While, Oxford’s Advanced learner’s Dictionary defines entrepreneur as “a person who starts or organizes a commercial enterprise, especially one involving financial risk”. In short, the difference between the definitions happens to be one of scope and emphasis!

Nevertheless, there are certain traits (associated with it), being accepted universally vis-a-vis entrepreneurship and its contributions in the growth, development and success of any sector or industry, namely: “innovativeness” and the “risk-taking ability”. In fact, many scholars believe and perceive that: “innovation” is the key factor behind entrepreneurship... wherein, “innovation: is supposed to be the creation of new products, markets, services, sources of supply, or forms of individual organization... as, it (innovation) acts as the dynamic force, in order to move the capitalist system!

Similarly, “risk-taking ability” or “risk-bearing capability” is a very important ingredient of entrepreneurship... since, the entrepreneurs stand to lose or gain for their own purse as a result of their own efforts (Dollinger, 1996).

Current Scenario (In India)

If we take into account of situation prevailing in the agriculture-based industrial sector, including dairy and/ or food industry in our country, it may be argued that the phenomenon of entrepreneurship, in the said field, is not so much prevalent; and hence, it requires special attention as well as encouragement from all sections of the society... albeit, the situation is not so grim as it seems, as there are instances of entrepreneurship in agriculture, dairy and food sectors! For instance, companies like Hindustan Level Ltd., Indian Tobacco Company (ITC), PepsiCo, Amul, etc. are foraying into different activities (that is, other than their main ones) through diversification of their products ...and, this is a good sign of progress!

Of late, the development of “rural entrepreneurship” has gained the status of a national movement – not only for industrial development, but also for solving the problems of unemployment as well as for upliftment of economically-weaker sections in rural areas (Ahmed, 2005). Moreover, the development of “indigenous entrepreneurship” is imperative for a country like ours, wherein the commitment is focused on an all-round socio-economic development of the people ... and, in this context, “entrepreneurship” may be even construed
as “an intentional/purposeful venture, involving initiation, promotion, and maintenance of economic undertakings – for the ultimate objective of production as well as distribution of wealth!”

On account of the problems associated with ‘unemployment’ in our country, it is widely perceived that “Self-employment” via “entrepreneurship” could prove to be a viable solution apropos the efforts meant for enhancing the employment opportunities ... because, only then, we would be able to convert the large number of “job-seekers” into “job-providers”! However, for that to happen, it becomes essential that we help those “job-seekers” (to) develop the “entrepreneurial qualities”!!

**Enterprises Suitable for Entrepreneurs in Agro-based Sector(S)**

It is the common perception that every entrepreneur wishes to start a new business, someday. For an entrepreneur, this ‘motivation-cum-challenge’ acts as a catalyst vis-à-vis his/her personal as well as socio-economic growth and development. Further, before starting any new venture, an entrepreneur needs to have a SWOT (i.e. Strengths, Weakness, Opportunities, and Threats) analysis of his/her “business-plan”. One of the basic requirements, while deliberating on ‘choosing an appropriate enterprise’, lies in the fact that: an entrepreneur needs to be a “generalist” ... instead of being a “specialist”... in order to understand the delicate nuances associated with all sorts of “factors” affecting his/her chosen field of work! In view of this, an entrepreneur may choose from any of the following enterprises deemed (to be) suitable, while wishing to be a ‘contributory-part’ of the growth and development of agro-based sector(s):

- Manufacture of agricultural implements.
- Designing and development of dairy processing gadgets.
- Providing harvesting-machineries, like - “Combine Harvester” as well as Tractors and/or (Diesel) Pumping-sets, etc. on hire.
- “Agri-clinics”-cum-“Agricultural/ Dairy Consultancy Services.
- Sales-centres for selling seeds, fertilizers, pesticides, insecticides, etc.
- Rice and flour mills.
- Animal/ livestock health centres.
- Shops meant for selling veterinary-medicines, animal feeds, etc.
- Dairy/ food processing units.
- Value-addition in agricultural/ livestock/ fisheries/ dairy/ food products.

**Entrepreneur-Friendly Institutions Providing Help and Assistance**

In India, there are several institutions available for the benefit of entrepreneurs, in the areas of finance, training, consultancy and technical guidance ... the names of which have been listed as below (Chinnadurai, 2005):

**A. Financial Institutions**

- Industrial Development Bank of India (IDBI)
- Industrial Finance Corporation of India (IFCI)
- Small Industries Development Bank of India (SIDBI)
- National Small Industries Corporation (NSIC)
- State Small Industries Corporation (SSIC)
• All Commercial Banks
• Cooperative Banks
• Regional Rural Banks (RRBs)
• Gramin Banks
• State Financial Corporation (SFC)
• State Industrial Development Corporation (SIDC)

B. Institutions for Technical Guidance
• State Industrial Development Organization (SIDO)
• District Industries Centre (DIC)
• Technical Consultation Organization (TCO)
• Small Industries Service Institute (SISI)
• Small Industries Development Corporation (SIDCO)
• National Research and Development Corporation
• Khadi and Village Industries Commission (KVIC)
• Department of Science and Technology (DST)
• Technology Development Cell
• LIC, GIC, and Unit Trust of India.

C. Training Institutions
• Small Industries Service Institute (SISI)
• Indian Institute of Packaging (IIP)
• District Industries Centre (DIC)
• Council for Advancement of People’s Action and Rural Technology (CAPART)
• National Bank for Agricultural and Rural Development (NABARD)

Measures to Develop and Strengthen Entrepreneurship

Developing entrepreneurship, or say, making the entrepreneurship broad-based, is a complex phenomenon. This is a crystallization of social milieu, from which entrepreneurs come, viz. family imbibe, make-up of their minds, personal attitudes, caste system, educational background, family occupation, and so on. In fact, several factors go into the making of an entrepreneur, and thereby, an entrepreneurial society (Khanka, 1998). In this context, it may be advocated that if some of the measures, as mentioned below, are followed; then, probably, we may succeed in developing and strengthening entrepreneurship for the overall growth and development of any sector (whether agricultural, livestock, dairy or food sector!):

i) Identifying the innovative ventures/enterprises suitable for entrepreneurs.

ii) Inculcation of entrepreneurial skills (through suitable types of training) among the would-be/probable entrepreneurs.

iii) Formulation of a proper “business plan” & its associated strategies at the micro-level vis-à-vis the chosen field of work.

iv) Development of infrastructural facilities and supporting services.

v) Creating awareness, through wide publicity, among unemployed youth and women about the availability of technical and financial assistances, facilities, and concessions meant for entrepreneurs.
Conclusion

Now-a-days, “entrepreneurship” happens to be the key ingredient apropos (of) success of any industry, in any given sector... agriculture, livestock, fisheries, dairy or food... and, we must not forget that creation of “entrepreneurship” in any society is not possible through individualistic efforts only! And, therefore, if we wish to inculcate the “entrepreneurial skills” among our unemployed youth and women, then there has to be a collective and cooperative effort to promote this endeavour!! However, for that to happen, the Central as well as respective state governments have to come forward, in creating a conducive and suitable environment, in order to encourage the would-be/ prospective/ probable entrepreneurs... apart from supporting the initiatives and efforts being pursued, already, by the private entrepreneurs, in this direction!!!

References


