

**Report of the visit of Indian food scientists
to Sweden and Denmark for The fourth strategic meeting of
the SASNET-Fermented foods**



22nd -30th October, 2006

**By
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Foreword

Here is a **report** of a visit of some prominent food scientists of India who are active in some of the important educational/research institutions from different parts of the country. Common to them is that they are all active in the field of fermentation and that they are the founding members as well as the of the members of the coordinating committee of a network

As **background** it can be stated that the visit was a part of the strategic activity of the newly formed www.Fermented-foods.net Swedish South Asian Network for fermented foods.

The **aim** was to come into contact with leading scientists of food companies and institutions of food sciences of this region to build links for promotion of higher education and advanced research primarily in the area of functional fermented foods.

The **method** of interaction was, to organize a one day seminar in Denmark in collaboration with Oresund food net, to take part in the International food and health innovation conference organized by Skane food innovation net work, to visit selected food companies, to visit selected food research institutions, to visit School of biotechnology at Royal Institute of Technology to see the modern equipments developed for study in fermentation in small scale and Arla foods in Stockholm to study the food innovation in an industry of global importance.

The main **result** or out come of this visit in addition to education, inspiration and other personal achievements in general are a number of research link proposals which are presented later on in this report and a concrete decision to organize a seminar on networking to promote strategic alliance among small and medium scale agro-food and biotech industries for development of new products and new markets in India.

By way of **acknowledgement** it must be stated that the visit was possible due to the support from SASNET- Lund University, Sweden., EU – Delegation, New Delhi, India., Sida- Swedish Agency for International development cooperation, Anand Agricultural University, India., Central Food Technological Research Institute, Mysore, India., Institute of chemical technology, University of Mumbai, India, Karnataka University of animal and fishery sciences, Hebbal, India. Maharashtra University of Animal Sciences, Warud, India. Oresund food net Copenhagen, Denmark., and Oatly AB, Landskrona, Sweden.

We all thank all those who have been helpful in making this visit a fruitful one.

Lund, Sweden 10th December 2006

Baboo M. Nair

NB: Please note that this report is prepared by me taking extracts from the individual reports of all the participants. Dr. PA Shankar, Dr. JB Prajapati, Dr. G Vijayalekshmi, Dr. Rekha Singhal and Dr. CD Khedkar.

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Preface

Fermentation is a unique method of food preservation with great potential. It has the advantage of being generally regarded as safe (GRAS) and at the same time offer immense opportunity for production of products which can be classified as “organic foods”, “natural foods”, “health foods”, “convenience foods”, “ethnic foods” “neutraceuticals” “functional foods” and not to forget “food for clinical nutrition”.

Fermented foods are manufactured and consumed practically in every part of the world. Cereals, pulses, root crops, vegetables, fruits, meat and fish are preserved by one or the other method of fermentation in some part of the world. The positive effects of fermented foods with prebiotic substances and, probiotic organisms in synbiotic foods is a matter of great attention among the researchers, medical practitioners, food companies, and marketing agencies, because the demand for such products is enormous and growing fast day by day.

In Europe, especially in Sweden and other Scandinavian countries it is the fermented milk products which form an integrated part of the common diet while in India and other countries of South Asia numerous varieties of fermented foods based on cereals, pulses, fruits and vegetables are common. In the light of growing globalisation, knowledge about the nature and type of microorganisms acting on these fermented products and their effect on the nutritional quality of the finished products are of great interest in general and in particular for future development of new functional food products.

Research and development is a considerably expensive item in the economy of a food company. However research and development could be effective and less expensive when it is carried out efficiently as collaborative network projects where various universities, industries, institutions, faculties and researchers work together towards a common goal. Development of modern food products also requires input from many different specialised areas of science and technology. Each step, starting from cultivation, harvesting, quality of the raw materials, processing, storage, nutritive value and safety before consumption, immediate effects on well-being and long term effects on health is too complex to be understood well by a single scientist. Moreover, a number of specialists can work together more efficiently and create lot of knowledge about a product or process in a short period of time.

In this context, a seminar and workshop was organized on ‘Fermented foods, health status and social well-being’ in November 2003 at Anand, India with basic support from SASNET-Lund University, Gujarat Agricultural University and National Bank for Agriculture and Rural Development, India. At the concluding session the participants resolved to form a network for promoting research and development of fermented foods.

The Main Objectives of the Network are

1. To offer a forum for scientists of the south Asian countries, Sweden and other countries for exchanging information in the field of food fermentation and its practical application related to health status and social well-being.
2. To promote collaborative research programmes among the scientists of Sweden and south Asian countries in the development of fermented foods as well as foster and maintain research links with scientists of similar interest all over the world.
3. To collect and disseminate knowledge on fermentation of foods from south Asian countries and to promote strategic alliance among food industries in development of new products and new markets.

Mode of Action

The above objectives of the network, SASNET Fermented foods will be promoted through conferences, workshops, seminars and symposia.

Membership

We may invite individuals, institutions and industries to become members of the network. Information about the membership can be obtained from the coordinator (prajapatijashbhai@yahoo.com) or can be obtained from www.fermented-foods.net.

Work Done Last Year

- During the year 2005, four strategic meetings were organised by the network with financial support from EU-delegation in New Delhi.
- The first meeting cum workshop was meant for the Heads of Institutions of higher education and research to get an appraisal of work done by these institutions on fermented foods and promote collaborative research projects.
- The second workshop was conducted for the policy makers of the food industries, to sensitize them about the potential of manufacture and marketing of fermented foods.
- The third meeting was for press/media and social/health workers, to use their influence to spread awareness in the society about the nutritional and health benefits of fermented foods. The fourth meeting is planned in Sweden. The network organized an international conference also in December 2005, which was attended by more than 250 delegates.
- Based on the presentation of concept of establishment of centre of excellence on fermented functional foods by the Chairman to the Minister of food processing Industries, a high level core group has been formed under the chairmanship of the Minister at the Ministry of Food Processing Industries, Government of India to develop four satellite centres of excellence for promoting the objectives of SASNET Fermented Foods. Chairman and Coordinator of SASNET Fermented Foods are important members of this 6 member group.
- The visit of the coordinating committee members in Sweden and Denmark to study the activities of the functional food science centre at Lund university and have meetings with Öresund food net was a part of the strategic plan of the network for its further development.

Participants, Members of the Delegation

Dr. JB Prajapati (Group Leader)

Professor and Head, Department of Dairy Microbiology,
SMC College of Dairy Science

Anand Agricultural University, Anand, Gujarat State, INDIA

Founding member and present **Co-ordinator** of SASNET-Fermented Foods

Dr. PA. Shankar

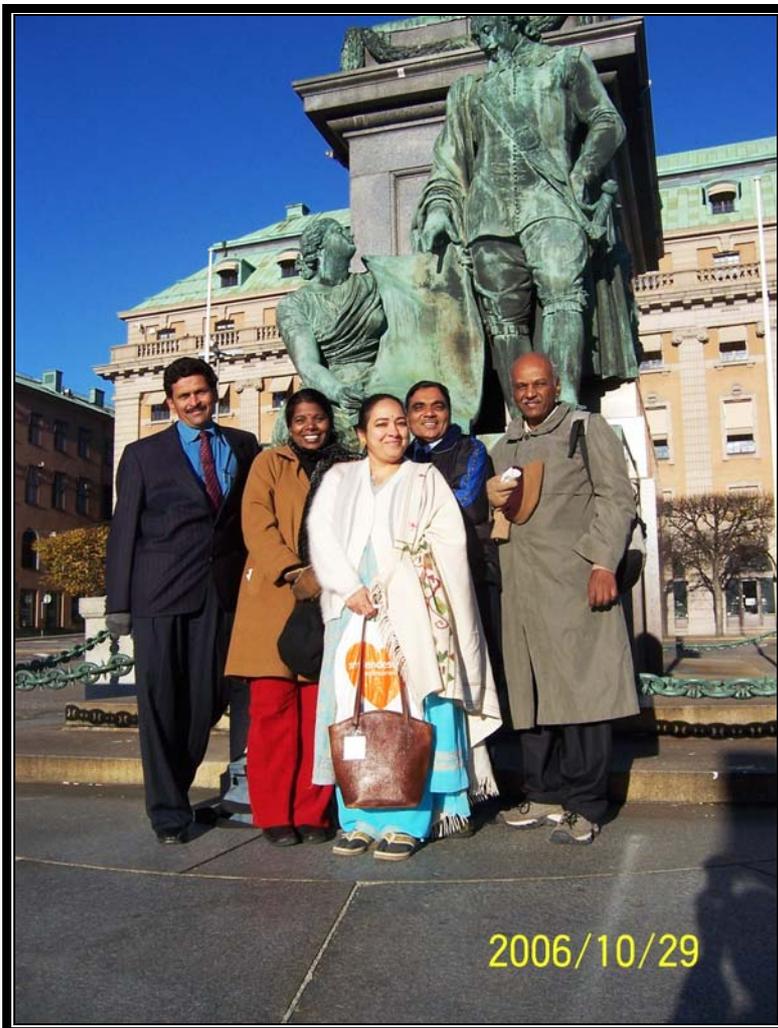
Professor and Director of Postgraduate Education

Faculty of Dairy Science

Karnataka Agricultural University, Hebbal

Bangalore, Karnataka State, INDIA

Founding Member and present member of the advisory committee of SASNET-Fermented Foods



Dr. (Ms) G. Vijayalakshmi

Deputy Director, Department of Food Microbiology

Central Food Technological Research Institute

Mysore, Karnataka State INDIA

Founding Member and present member of the coordinating committee of SASNET-Fermented Foods

Dr. (Ms) Rekha Singhal

Professor of Food Technology

Department of Chemical Technology

University of Mumbai, Maharashtra State, INDIA

Founding Member and present member of the coordinating committee of SASNET-Fermented Foods

Dr. Chandraprakash D Khedkar

Professor of Dairy Technology

College of Agriculture animal science and fisheries

Warud, Pusad, Maharashtra State, INDIA

Founding Member and present member of the coordinating committee of SASNET-Fermented Foods

Dr. NS. Varshneya (will be coming in April 2007)

Vice Chancellor,

Anand Agricultural University,

Gujarat State, INDIA

Member of the advisory committee of SASNET-Fermented Foods

Ms. Lata Ramachandran (substituted with Padma Ambalam who became sick)

Assistant professor,

Dairy Science College, Anand

Gujarat State INDIA

Member of the coordinating committee of SASNET- Fermented Foods



A social visit to my home before the official business.

**Dr. Abdulla, Dr. Shankar, Dr. Prajapati (standing) with
Dr. Khedkar, Nisha, Nila, Kamala, Dr. Vijayalekshmi and Dr. Rekha Singhal. (Sitting)**

Program

Day	Date	Program
1	21 Oct 06	Left India from Bombay by Swiss Air LX 155 to Zurich and then by LX 1266 to Copenhagen
2	22 Oct 06	<ul style="list-style-type: none"> • Prof. Baboo Nair received us at Copenhagen Airport and reached by train to Malmo, Ibis Hotel at 11.00 • Visit to Dr Nair's home at 15:00 • Visit to Alnarp Campus • Dinner in Lund Hotel (hosted by Dr Abdulla)
3	23 Oct 06	<ul style="list-style-type: none"> • Scientific seminar in Copenhagen (Orestad) organized by SASNET-Fermented Foods and Oresund Food Net. (9:30 -15:30) • Reached Malmo by night.
4	24 Oct 06	<ul style="list-style-type: none"> • Company visits – Biogaia & Indevex (13:00 – 17:30) • Dinner at Hotel New Delhi in Lund.
5	25 Oct 06	<p>IFHIC 2006 International Food & Health Innovation Conference:</p> <ul style="list-style-type: none"> • Lab tour – Food technology Dept of Lund Institute of Technology and The Clinical Research Centre of UMAS, Malmo (8:30-12.15) • Registration at the conference - 12:30 • Plenary Session - 13:30-16:30 • Parallel Nutrition and Innovation Sessions - 16:30-18:00 • Welcome Banquet at the City Hall – 19:45-23:00
6	26 Oct 06	<p>IFHIC 2006 International Food & Health Innovation Conference:</p> <ul style="list-style-type: none"> • Parallel Nutrition and Innovation Sessions - 09:00-18:00 • Open House with buffet dinner – 18:00- 20:00
7	27 Oct 06	<p>IFHIC 2006 International Food & Health Innovation Conference:</p> <ul style="list-style-type: none"> • Parallel Nutrition and Innovation Sessions - 09:00-14:45 • Closing Plenary Session – 15:00- 15:40 • Post-conference mingling – 15:40

8	28 Oct 06	<ul style="list-style-type: none"> • To Copenhagen City by train in the morning. Luggage kept at Malmo Station • Sight seeing by bus 11:00-13:30 • Reached Malmo by train at 16:00 • Proceed for Stockholm by 17:26 train. Reached Stockholm by 23:00 at Hotel Vanadis.
9	29 Oct 06	<ul style="list-style-type: none"> • Sunday – Sight seeing in Stockholm first by bus and then by boat (11:00-12:30 and 12:30-13:30) • Late Lunch in Indisk hotel and back to hotel at 17:00
10	30 Oct 06	<ul style="list-style-type: none"> • Visit to Royal technology Institute (KTH) 9:30-12:15 • Meeting with Ambassador and Lunch at Hotel Asha – 13:00-14:15 • Visit to Arla Foods – 14:30 -17:00 • Shopping in Stockholm
11	31 Oct 06	<ul style="list-style-type: none"> • Leaving early morning at 4:00 from Hotel Vanadis by taxi to Arlanda Airport • Return journey to Zurich by LX 4667 and to Bombay by Swiss Air LX154 • Arrival in Bombay at 22:30
12	01 Nov 06	<ul style="list-style-type: none"> • Journey from Bombay to Vadodara by 9W 343 Jet Airways • Vadodara to Anand by Car; reached Anand at 13:00



Arrival at the Copenhagen airport.

Report <http://www.oresundfood.org/?page=news&id=20061207102836>

from the seminar on “Fermented foods Health Status and Social well-being”

held at Örestad, Denmark on 23 October 2006.

- **Organised by:** The [SASNET-Fermented Foods Network www.fermented-foods.net](http://www.fermented-foods.net) in collaboration with the [Øresund Food Network www.oresundfoodnet.org](http://www.oresundfoodnet.org)
- **Venue:** Øresund Food Network, Arne Jacobsen’s Alle 15-17, Ørestad, Copenhagen

A summary of impressions, points of view and final outcome of the meeting



Dr. Jorgen Holm of Öresund Food net, **Dr. PA Shankar**, **Dr. Rekha Singhal**, **Dr. G. Vijayalekshmi** , **Dr. Baboo M. Nair**, **Mr. Lars Eklund** of SASNET Lund University, **Dr. CD Khedkar**.

The morning session between 9.30 and 12.30, consisted of five presentations by five food scientists of five different academic institutions of India. Just before the beginning of the session **Dr. Jörgen Holm**, Director of development of Öresund Food Net introduced the Öresund Food net while he welcomed the participants to the seminar. Following this, **Dr. Baboo M. Nair**, Professor of Lund University gave a short presentation of SASNET Fermented-Foods.net and its intentions.

The first technical presentation was by **Dr. J.B. Prajapati** Professor & Head, Department of Dairy Microbiology, SMC College of Dairy Science, Anand Agricultural University, Anand – 388 110 (Gujarat) who talked about the isolation of a lactobacillus strain from human sources and its utilisation for making foods following a series of experiments for evaluating the probiotic characteristics of the strain. Initially several strains of Lactobacilli, Streptococci and Bifidobacteria were isolated from milk and milk products as well as from human sources intestinal and vaginal tracts. Preliminary identification of the isolates was done by morphological and biochemical tests. Their usefulness in fermenting milk was also studied by checking their rate of acid production and growth in milk. The promising strains were also tested for their antimicrobial activity against *E. coli*, *Staph. aureus*, *Salmonella*, *Bacillus cereus*, etc. Then they were also tested for their ability to pass through and reside in the intestinal tract by tests such as acid, phenol and bile tolerance. Some strains of Streptococci viz. MD₂, MD₈, D₃ and DI₆ were tested for making Dahi (set curd) using cow and buffalo milks and some strains of Lactobacilli viz. LB₁, V₃, I₄, 4A and C₂ were used to make acidophilus milk and tested their viability and stability apart from organoleptic properties. Similar studies on bifidus milk preparations using *Bifidobacter adolescentis* Hb₁, were also made. Based on the results of these experiments technology for manufacture of acidophilus lassi (Stirred Yoghurt) containing *Lb. acidophilus* V₃ and *Streptococcus thermophilus* MD₂ was developed. The product was highly acceptable, having a viable count of 200 million lactobacilli/g and shelf life of 27 days at 5 ± 2°C.

As a partial substitute for milk solids, mung bean flour and wheat flours were also tried as carrier to three strains of *Lb. acidophilus*. The cultures were added to a blend of the above and dried under vacuum. The count of Lactobacilli in dried preparations ranged from 200 to 4600 millions per gram. Maximum survival of 28.7 % was observed in gram+tomato+skim milk blend soon after drying.

To obtain higher number of viable cells in the dried product an attempt was made to modify the cultures by adapting to heat shock in presence of tomato, which gave 6 fold increase in the heat tolerance of the culture. The spray drying process was standardized incorporating tomato and banana in the fermented milk, which gave highest possible survival of about 14% in the dried preparation. The preparations were organoleptically acceptable, had higher nutritive value in terms of vitamin content and protein quality and when fed to human volunteers, the lactobacilli could implant in the intestinal tract suppressing the population of coliforms.

A blend of milk powder and preheated and enzyme treated rice flour was converted into a probiotic food by incorporating freeze-dried cells of *Lactobacillus acidophilus* V3 in it. The product had on an average 10.9% fat, 22.3% protein, 3.2% ash, 61.7% carbohydrate and 2.1 x 10⁹ cfu/g of live lactobacilli. The count of lactobacilli reduced to 26 x 10⁷ cfu/g after four months of refrigerated (5 ± 2°C) storage.

The second presentation by **Dr. CD Khedkar** professor of Dairy Technology, College of Agriculture, Animal Science and Fisheries, Warud, India., during the morning session was on the isolation and identification of promising strains of *Lactobacillus acidophilus* from human body sources and screening them for their antimicrobial properties on human volunteers

One hundred and eighty isolates were obtained from human vaginal surface swabs and gastrointestinal tracts of healthy children. After screening for their biochemical and physiological characteristics, two were identified as *Lactobacillus acidophilus* strains. The rate of acid production and increase in viable counts of these two strains were studied. The vaginal isolate LBKV₃ gave highest counts at 24 h while the intestinal isolate LBKI₄ gave the highest viable counts at 32 h.

Antibacterial activity of these two strains against enterotoxigenic *Staphylococcus aureus*, mastitic *Escherichia coli*, toxigenic *Pseudomonas aeruginosa* and a pathogenic strain of *Salmonella typhosa* was evaluated by employing cup-well assay. It was observed that both of the strains of *Lactobacillus*

exhibited antibacterial activities against all the test organisms. However, the highest antibacterial activity was exhibited by vaginal isolate. The cell-free-culture-filtrate obtained from 16 h growth of the culture showed highest antibacterial activity against all the test organisms.

To study the **hypocholesterolaemic effect** of *L. acidophilus* strains, twenty randomly selected human volunteers in each of three age groups (30-40 years, 40-50 years and 50-60 years) were used. Acidophilus milk with 0.8% (LA) and containing 3×10^7 cfu/g of human vaginal isolate i.e. LBKV₃ was fed to each of the test group volunteers @ 200 g/volunteer/day. The blood serum cholesterol levels were analysed before commencing the feeding trials, at an interval of seven days during feeding and after terminating the feeding trial. The results showed that Acidophilus milk significantly reduced the cholesterol in blood even fifteen days after terminating the feeding trial in all the three age groups.

The **implantation ability** of *L. acidophilus*-LBKV₃ was studied by using feeding experiments with tribal children below five years. Investigations on bile tolerance, salt tolerance, antimicrobial properties, and phenol tolerance of the strain to be used as a probiotic have been confirmed by conducting *in vitro* experiments prior to the implantation experiment. The results showed that feeding of Probiotic Acidophilus Milk resulted in many fold increases in Bifidobacteria (the range was 0.4 to 2.6 log counts), Propionibacteria (0.2 to 1), Lactobacilli (0.4 to 2) and Lactococci (0.6 to 1.7) counts and very sharp decline in the harmful type organisms in the faecal matter after fifteen days of commencing feeding trial in all the three age group of volunteers.

Next presentation before lunch was on the production of β -Glucans from microbial sources **by Dr. Rekha S. Singhal** of the Food Engineering and Technology Department, Institute of Chemical Technology, University of Mumbai



Microbial, β -glucans are homopolysaccharides of glucose and are classified as a drug under the category known as 'Biological Response Modifiers'. These include mainly: β -glucans having exclusively β -(1 \rightarrow 3) linkages (eg. curdlan from *Agrobacterium radiobacter*), β -glucans having β -(1 \rightarrow 3) and β -(1 \rightarrow 6) linkages (eg. yeast glucan, scleroglucan from *Sclerotium rolfsii*, schizophyllan from *Schizophyllum commune* and β -glucans having exclusively β -(1 \rightarrow 6) linkages (e.g. pustulan)

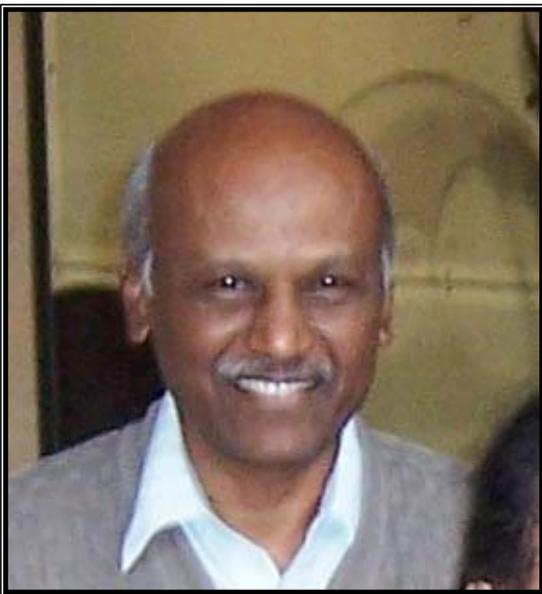
Fermentative production and downstream processing of four different β -glucans *viz.* yeast glucan, curdlan, scleroglucan and schizophyllan from different microbial sources was studied with respect to optimization of media constituents and environmental factors.

Different complex media such as sugarcane juice, coconut water, and sugar cane molasses were evaluated for the production of scleroglucan and schizophyllan. Scleroglucan yield was 23.87 g/l when sugarcane juice was supplemented with optimized media constituents except sucrose, yeast extract and sodium nitrate. In case of schizophyllan, the yield was 4.32 g/l when sugarcane juice was supplemented with optimized media constituents except sucrose and beef extract.

Repeated solvent precipitation followed with gel permeation chromatography was used for isolation and purification of the polysaccharides. Their purity was then confirmed by IR and NMR spectroscopy. The β -glucans (curdlan and scleroglucan) were studied for their application

in pharmaceutical industries as matrix for controlled and sustained release of drugs. Curdlan was also evaluated as a matrix for immobilization of enzymes.

Dr.P.A.Shankar, Professor of Dairy Microbiology & Director of Post graduate Studies, Karnataka Veterinary Agriculture and Fishery science University, Hebbal, Bangalore, India. gave the next presentation on the production and evaluation of biofilm based lactic acid cultures for immuno-modulatory properties.



The Lactic cultures are usually produced by growing them in liquid medium & then preserved by various techniques to enhance their shelf life. Conflicting results have been reported regarding the immuno stimulatory properties of these lactic cultures and the fermented products prepared from such liquid cultures. There has been an upsurge in the interest in the characteristics of lactic cultures grown on solid substrates in the form of biofilms. Biofilm based cultures exhibit several unique characteristics not shown by the same cultures grown in liquid medium. These characteristics include modifications in cell wall constituents, presence of stress & unique proteins, high level of activity of certain enzymes etc. Lactic cultures grown on natural nutrient substrates & natural non-nutrient substrates supplemented with synthetic nutrients were evaluated for their growth pattern. The performance of such cultures in the production of fermented dairy products was also assessed. Feeding trials in laboratory animals were carried out to determine their health-promoting properties. The results of these experiments showed that biofilm based cultures always showed higher & better properties compared to liquid cultures.

Dr. G. Vijayalakshmi of the Food Microbiology Department, Central Food Technological Research Institute, Mysore, India., talked about the utilization of a filamentous fungi as functional food. There are several reports on the microbial synthesis of colour (pigments) that can find application in food formulations. The production by fermentation is costly since these pigments are produced only in small



quantities Studies on polygalacturonase production by *Aspergillus carbonarius* identified that the enzyme secretion was less due to reduced branching of the fungus in shake flask growth. Accordingly a hyper branching mutant was developed that secreted polygalacturonase as a major protein.

The mutant that thrived in the acidic condition (~ pH 3.0) produced more enzyme compared to those mutants that did not tolerate this pH. A process for producing polygalacturonase in submerged method was developed with the pH tolerant mutant.

The acid tolerant mutant in order to protect itself from the pH toxicity synthesized and accumulated partially

saturated canthaxanthin and partially saturated astaxanthin in their membranes to maintain the intracellular ionic balance. Thus an integrated fermentation for the pigment, which is yellow in colour and industrially important polygalacturonase, was developed. The yields of pigment and the enzyme were ~900mg/g dry cell mass and ~240 Units/mL respectively.

The partially saturated canthaxanthin had a structure similar to that of the retinoids described in the literature. Thus its use as anticancer drug was studied by conducting experiments on metastatic cell lines. By acute toxicity studies it was shown that a dosage up to 5g/Kg body weight of pigmented biomass is toxicologically safe. In sub-acute toxicity studies, a diet with 2% (w/w) for 14 weeks showed that the pigment is safe to normal cells.

Thus through an integrated fermentation process three products such as the polygalacturonase enzyme in the broth, the pigment in the biomass with a potential functional property and the biomass itself as single cell protein (SCP) could be produced.

The after noon session started with a presentation by **Dr Peter Olesen** of Christian Hansen A/S Denmark who described the company he represented and its business and future interests in the world market which was mainly Improving the quality of food and health for people all over the world where, he find that The ideal functional food platform for nutrition and health would be Fermented Milks. Chr. Hansen A/S today have an annual Sales of 480 m Euro, 2.600 employees in 32 countries, 85 distributors/agents all over the world, invest 6 % of turnover in Research & Development, at state of the art R&D facilities in Denmark and development centres in Denmark, USA, France and Germany, as well as application laboratories in 21 countries. They also have state of the art manufacturing facilities on three continents.

Dr. Olesen went on to show the estimates of WHO that the life style related diseases are going to dominate in the future and by the year 2020, 70% of all the diseases would be related to lifestyle. In this background, functional foods have a very clear place in the day to day diet of the population of the world.



**Dr. Peter Olesen of Chr Hansen A/S and Dr. CD Khedkar of SASNET, India
with Dr. Esko Pajunen of Carlsberg Research Centre**

Then he developed the philosophy of the business of Christian Hansen under following heads

- Health is the future of food
- The marketing power of intrinsic healthfulness
- Fruit – the future of functional foods
- Fine times ahead for fibre
- Packaging for the “me” generation
- The functional beverage boom rolls on
- The upsurge of functional private label
- Communicating the benefit is key to success
- Asia is the place to look for innovation
- Kid’s nutrition still a strategic priority

As far as Christian Hansen is concerned according to Dr. Olesen, ”wellness will be for the next 15 years what convenience was for the last fifteen” and ”wellness is the trend and every company must have a clear view on and how wellness is going to impact its products and how it will do business in a world in which wellness is the norm”

Trends of research in probiotics at Chr.Hansen A/S would be, under Human Health & Nutrition: focused on dietary supplements for gut health, boosting of immune defence, constipation, vaginal health, inflammatory gut diseases and infant nutrition moving towards clinical nutrition while under”Functional Foods”: attention will be directed from gut health parameters (‘soft’) to specific health functionalities (‘harder’) expressed in food products – example is the new product Cardi-04. A study on the effect of Cardi-04 on systolic and diastolic blood pressure in spontaneously hypertensive rats, measured by telemetry is being published

Next presentation was by **Dr. Egon Bech Hansen** of Danisco A/S, Denmark on Health promoting food ingredients. Danisco A/S he said is the Leading supplier of ingredients and sustainable bio-based solutions. They produce Emulsifiers, Stabilisers, Enzymes, Cultures, Protectants, Flavours, Sweeteners, Sugar. The industries they cater are Food & Feed, Grain Processing, Cleaning & Textiles etc with an annual turnover of DKK 20,912 million (in 2005/2006) employing 10,636 people in 2005/2006 in 40 countries. According to Dr. Hansen Danisco is the Leading supplier to the global food industry. For example Danisco is part of: half of all ice cream, every fourth loaf of bread and every fourth fermented dairy product consumed in the world. Any food product may contain one or more Danisco ingredients like sugar, sweeteners, flavours, emulsifiers, stabilisers, functional systems, cultures, enzymes, antimicrobials.

The present development at Danisco is based on the role of speciality carbohydrates in disease risk reduction, targeting mainly oral health, type 2 diabetes, cardiovascular disease and digestive health. For baking industry Danisco aims to supply enzymes for improving dough behaviour and some components of wheat as functional ingredients like amylases, monoglycerides, proteases, oxidative enzymes. Xylanase and DATEM both have a positive effect individually and an additive effect when used in combination.



Dr. Egon Bech Hansen of Danisco A/S and Dr. Prajapati of SASNET FF

Danisco is also interested in Nutrigenomics for understanding of how nutrients (bioactive compounds) can modulate gene expression. Current research, linking the activity of bioactives on gene expression in well known pathways of complex diseases (heart disease, stroke, cancer, diabetes, and arthritis)

It is also expected that the research activity of Danisco in nutrigenomics would enable strains to be developed or selected that can be used to impact a range of targeted health maladies. In this connection, *acidophilus* adherence *in vitro* and Cytokines and Immune Health are important. Among the Danisco's health & nutrition ingredients POLYOLS Xyitol, Lactitol, FIBRES & PREBIOTICS Litesse, Betatrim., PROBIOTICS Florafit, Howaru and Benefat, Fructose, Betaine are reported to be well known by the speaker.

The next speaker **Dr. Åsa Ljungh**, Dept of Laboratory Medicine, Section for Bacteriology, Lund University, Lund, Sweden elaborated various modes of action of common known probiotics and the Selection criteria applicable to Lactic Acid Bacteria to be used as commercial Probiotics. Dr. Ljungh started by saying that the Probiotic foods were consumed by prehistoric man to digest roots and other dietary fibers, to ferment fruits ("prehistoric wine and beer"), to protect baby foods, to combat food decay, e.g. mycotoxins (also in the gut) etc . where the microbes used as probiotics were mainly *Lactobacillus* spp, *Enterococcus* spp, *Lactococcus*, *Leuconostoc*, *Pediococcus* spp, *Bifidobacterium* spp, *Bacillus subtilis*, *B vietnam* and others, *Saccharomyces boulardii*, *Clostridium butyricum*, *Staphylococcus* spp

Dr. Åsa Ljungh and Dr. Jb Prajapati According to Dr. Ljungh, among the important selection criteria for commercial use of probiotics, survival during transport in the GI tract, i.e. acid and bile tolerance, adhesion to intestinal mucus, production of heat shock proteins (acid stress), production of β -galactosidase (c.f. lactose intolerance), binding of mutagens, specific activity against intestinal pathogens like rotavirus, *Salmonella*, *Campylobacter jejuni*, travellers' diarrhoea, diarrhoea of the piglets and newborn calves, inhibition of translocation, induction of pro- or antiinflammatory cytokines (IL-10). no carriage of plasmids for antimicrobial resistance, safe interaction with lipid metabolism, production of

exopolysaccharides, similar to β -glucan from oat (cholesterol/s \downarrow), utilization of inulin, amylopectin and β -glucan as sole source of carbohydrate (cholesterol/s \downarrow , bioavailability of minerals \uparrow , lipid/s \downarrow) could be of importance. Finally she presented a review of different ways by which the probiotics act on the host and how the effect could be monitored invitro and or by invivo studies on animals or humans.



The last invited speaker of the day was **Dr. Olof Mårtensson** of Oatly AB, Sweden. He presented data on the production and use of the non-dairy beverage based on oats which has high protein of good amino acid composition, high content of oleic and linoleic acids in addition to high amount of vitamin E

, Vitamin B1, folic acid as well as high amount of the soluble dietary fibre component B-glucan.

The experiments they carried out on production of non-dairy fermented milk based on oats and its keeping quality, its effect on intestinal microflora and effect on plasma lipids show that there is a good possibility of making a oat-based fermented milk like product of acceptable sensory quality with positive health effects. Some of these results have been published in nutrition research 25, 2005 and Food research international 35, 2002.

Probiotics in Sweden

<i>Lb. acidophilus</i>	Gaio Dofilus , A-fil; Arla, Öresundsfil; Skånemejerier Mild Naturell Yoghurt; Valio
<i>Lb. casei DN-114 001</i>	Actimel ; Danone
<i>Lb. casei F19</i>	Gaio Dofilus , Gaio yoghurtdryck; Arla
<i>Lb. reuteri</i>	Bra-fil R-yoghurt; Ingman Foods Oy AB
<i>Lb. plantarum 299v</i>	ProViva Fruitdrink and Yoghurt ; Probi
<i>Lb. paracasei F19</i>	Kultura ; Arla
<i>Lb. rhamnosus 271</i>	Viktväktarnas yoghurt ; Skånemejerier
<i>Lactococcus lactis L1A</i>	Verum Drickyoghurt , Verum Hälsofil, Verum Hälsoyoghurt; Norrmejerier
<i>B. longum</i>	Onaka ; Arla
<i>B. lactis</i>	Gaio Dofilus ; Arla Öresundsfil; Skånemejerier



OATLY

Concluding remarks

- Different oat-based suspensions can be used as substrates for various kinds of lactic acid bacteria (LAB).
- Formation of EPS from LAB during fermentation have an effect on the structure in oat-based suspensions.
- Possible to formulate fermented oat-based products with an acceptable sensory characteristic.
- Indications that fermented, oat-based products have beneficial physiological effects in humans in terms of reduction in plasma lipid levels and "bifidogenic" effect.



In conclusion

Following the last presentation there was a concluding session providing room for questions and answers as well as discussion in a workshop form to evolve proposals for continuation of the cooperation including opportunities for collaboration with India and other south Asian countries.

The general view of the participants of the seminar was that there are many interesting aspects of traditional fermented foods of south Asia with respect to health promoting properties which are well known though not properly documented through scientific and clinical experiments. More basic as well as applied research on traditional South Asian fermented food products especially/particularly those of India may contribute in the NPD on functional foods as well as food to combat malnutrition. The common understanding of the meeting was that a further collaboration between Indian and Swedish/Danish partners should include research as well as business aspects.

The following opportunities were identified by the participants:

1 Bring fermented Indian concepts and new products to a wider market

Screening & selection

In Europe especially in Nordic countries, there is a lot of knowledge in production of pure cultures for dairy industry. In the Indian subcontinent there are a number of cereal and legume based fermented foods commonly manufactured and consumed at house hold level in large quantities. One good collaborative project could be based on screening of specific Indian strains/cultures & traditional fermented non-dairy products by institutions/industries of the Öresund region in collaboration with Indian institutions/industries for improved documentation of the strains with respect to health promoting effects as well as functional and sensory properties. This could be evolved as an integrated part of a project of development cooperation to assist India to take advantage of its food culture in entering the global economy while for Öresund institutions it may offer a chance to apply the competency available in developing and marketing pure cultures for production of these products in an industrial scale for global marketing. It is important for India to produce more and more value added food products for export if it should succeed in raising the productivity of the agro-food sector and there by increase the income and purchasing power of the of the poor people who get their income from this sector.

In an ongoing project carried out by SASNET which is financially supported by EU a pilot study on traditional Indian products is being undertaken and an extensive data collection project is being developed. A collaboration between Öresund and India could be a continuation of this effort. Work to be done is collection of samples of traditional fermented foods, identification of the strains and its characterisation with a view to using them for production of starter cultures.



NPD & Upscaling

NPD to adapt selected concepts to the consumer needs on specific non-Indian markets

It can be said without much exaggeration that Indian foods are well known all over the world. A proof of this is the presence of Indian restaurants in practically every metropolis of this world. However, it is not easy for any one to buy Indian foods in any of the stores of world market. This is, it is believed, due to the lack of research and knowledge in the keeping quality of prepared Indian food items. In the domestic market Indian food items have a quick turn over and are consumed in a few days. If India has to take part in the global market, there is need for study of shelf life and keeping quality of prepared foods and new knowledge on how to extend the life of such products. There is need for study of the role of carbohydrates, proteins lipids and other components in the physical properties of the foods and their fate during packaging, transport, and storage at different conditions of temperature, pressure moisture content etc.

There is a great need of new knowledge in food science and nutrition for successful up scaling of traditional Indian small scale production to render Indian fermented products more commercially available and accessible in India and other markets. At present numerous very small players are

predominant and the level of value addition in the Indian agro-food sector is only around 7% and the total value of Indian export to the global market is less than 1%. It is inevitable for India that it should increase its export of products and mainly agricultural products if it intends to promote poverty alleviation as it is stated in the policy document of the present government of India

2. Communication and documentation

SASNET is primarily a network of scientists while Oresund food net organises food industries. SASNET in cooperation with ÖFN could play a role in promoting functional food on the Indian market based on the thorough experience in Scandinavia. A close cooperation could facilitate flow of information not only between two countries but also between two continents as Öresund is opening doors to EU and SASNET represents all the countries of south Asia. If we cooperate in collecting information and build a data base then we will have access to information and knowledge useful not only for research and higher education but also for commercial purposes leading to profitable enterprise of mutual benefit.

3. Strategic alliances

SASNET and ÖFN is also interested in contributing to the establishment of strategic alliances between institutes in India and Sweden/Denmark. The focus could/would be on alliances between SMEs of the Agro-food and biotech sector to stimulate innovation - developing new products and new markets within the food-health sector. A “matchmaking” seminar could be organised in India during 2007.

The Company Visits

Thanks to the organizers of Malmo conference who organized visits to Biogaia and Indevex on 24th October 2006. Biogaia, www.biogaia.com is now coming-up with its own brand with launch of probiotic chewing gum, lozenges and chewable tablets for gut health. The beautiful presentation by Mr. Christoffer Lundqvist, Product Manager gave the glimpse of research and clinical trials (26 trials involving 2613 subjects) on *Lactobacilli reuteri* strain which has been found very useful in oral and gut health of human beings. The strain was first isolated by Prof. Gerhard Reuter of Germany in late 70's . The gift samples given by the company have been tasted by our group at the Department. I talked about SASNET-FF to Mr. Christoffer and offered to give support in clinical trials for *Lb. reuterii*, if required in India.



The visit to “Indevex”, www.indevex.com was a new fascinating experience. In a beautiful country side near Lund, the Igelosa Life Science Community building makes people healthy and happy. The company has come out as an off-spring of Lund University Hospital, where **Professor Stig Steen** is working as specialist lungs transplant surgeon. His different and innovative way of thinking to keep people alive has given birth to this company. An important part of his research has focused in developing an easily ingested food product that contains exactly the right combinations of ingredients to make critically ill patients strong enough to withstand transplant operations and to quickly regain their health afterwards.



He emphasized that the food must contain a complete mix of nutrition to keep body in anabolic (muscle-building) condition and these food must be based on pure natural genuine food ingredients, since most persons respond negatively on synthetically processed additives. His company has come out with several low Glycemic Index foods branded as “Inzone” in the form of All Food Drink, Muffin, Bars, Chocolates and Balance drink. We were given all these samples for taste and we really enjoyed them! The company has a well equipped hospital with the state of the art operation theater. Their Chinese Collaborator Doctor showed us the operation theater and a life saving instrument “LUCAS” which is used to give artificial breathing while the patient is being transferred to hospital. Presentation by Dr Christer Franszen, Managing Director and Video show of actual lung transplant operation was really thrilling!

The Lab Tour

The forenoon of Wednesday, 25th October was busy in visiting Food technology Dept of Lund Institute of Technology and The Clinical Research Centre of UMAS, Malmo. The presentation by young scholars of LTH on glycemic index, gelling properties of various starches, GI reducing food ingredients, etc was fascinating. The laboratories are well equipped with state of the art instruments and other consumables to conduct advanced research.



The visit to UMAS, Clinical Research Centre of Faculty of Medicine of Lund University at Malmo was a unique experience. We were lucky that **Dr. Hugh Connell**, Administrative Director of the institute, who had been the master mind behind entire architecture of the building and interior design, suited to working by the scientists and students was with us to explain the minute details of the building and working inside. The building has been made with plenty of glass inviting day light. The research cabinets for tissue culture and microbiological work have also been provided with glass walls so that person working inside can see what is going on out side and vice versa. All the chairs are ergonomically designed so as to keep the persons active and stress free. The entire education at UMS is through Problem Based Learning (PBL) technique. There are small rooms with plenty of place to write on white boards, where 8-10 students can sit together and discuss various topics of their learning. The students are given practical experiences of working in medicine and surgery by facing them with dummy patients and a robot.

The International Food and Health Innovation Conference was really innovative especially for the Indian delegation as there are striking differences in organization for example;

- There was no formal inaugural session, no dais with important persons on stage, no formalities.....
- The Moderator, Prof. Peter Sylwan, a science writer invited Mr. Bengt Holgersson, Chairman of Skane Food Innovation Network and Former Country Governor of Skane Region at the podium for welcome address. In seven minutes he welcomed the guests, introduced to the theme of conference and declared conference open!
- The registration was simple and delegate friendly. One perforated sheet contained delegate badge, label for bag, label for type of food, conference dinner pass and most importantly a bus pass-municipality of Malmo had given a free bus pass for the delegates to travel from their hotel to conference venue.
- There was overwhelming participation of food companies at the exhibition with plenty of live samples of food and lot of relevant literature. I appreciate a counter by renowned scientific publisher with free sample copies of the journals.
- The poster session with display of 80 posters at a time was well organized.
- Frequent serving of food and beverages and fruits *ad libitum*. You can sit with a cup of tea/coffee or a fruit in the session, relax, listen and learn!!
- I appreciate the arrangement of vegetarian food made by the organizers for a very few people like me!
- Another most appreciating thing was the punctuality of the entire program. Everybody was sincere in keeping their time that avoided unnecessary hassles and boredom.
- The concluding session was again exciting. The moderator, Prof. Peter Sylwan called expert panel of three eminent personalities, Dr Kelley Fitzpatrick, Coordinator of FlaxCanada 1015; Dr Mahmood Khan, Global Innovation Leader, Unilever, USA and Prof. Inger Bjorck, Director of Functional Food Science Centre, Sweden at the podium and asked questions like a journalists to get information about what this conference is, what we have learned, what is required to be done in future, what have we achieved, etc, etc???
- The closing address with vote of thanks was given by Mr Goran Tunhammar, Country Governor of Skane.
- As soon as the conference ended, all the participants got an email with feed back form!



In the inaugural plenary session there were three presentations enough to agitate you! I liked the most aggressive presentation by **Dr Bruce Holm of Canada** explaining the fact with full data that how functional food ingredients can reduce the health care costs significantly. He advised to switch over from current “medical model” to aggressive “preventive model” based on introduction of risk factor modifying functional foods plus nutraceuticals from early age. As per his estimates, minimum Canadian savings in direct health care expenditure could be 10 billion dollars per year. The next presentation by **Dr Fred Brouns from USA** was all about decreasing ‘negatives’ and increasing ‘positives’ in functional foods for improved public health. He stated that we have a challenge of integrating nutrition and consumer sciences, public health and government need more intensively.



After this session, there were 14 parallel sessions on 'Nutrition' and 'Innovation' and one company seminar on Superfruits – new research for functional fruit based foods and beverages by Hort Research. New Zealand. I could attend some lectures in both nutrition and innovation sessions. I was happy to know that several food clusters, food innovation networks and groups are actively functioning in Europe and are being actively supported by industry, university and government. In the nutrition sessions there were many presentations on hard core medical aspects of food.

It was delighting to know that European doctors, real medical practitioners take interest in R & D in food and health. This is going to reduce their work and cut down medical costs. This is good for the society and the government because medical facilities are provided to the citizens by the government. In India, I feel that real medical practitioners are skeptic and dis-interested about food research and innovations. Is it because this type of research will make people healthy and reduce the income of doctors??!!

Well, I had a glimpse of posters during coffee and lunch breaks couple of times. I learnt the way of presentation from some of the posters while some poster gave an idea of new concept, for e.g. consumer reasoning concerning healthy food, Effective communication strategies for functional foods, Food + Parma = unlimited health, Antidiabetic food centre and FUNCFOOD –an interdisciplinary Ph.D. programme started at Lund university. Our Indian delegation presented total seven posters at the conference.

The grand welcome banquet hosted by the Dy. Mayor of Malmo at city hall on 25th October was a memorable one.

Leisure time at Copenhagen.....

On 28th October, we enjoyed walking on the streets of historical city and capital of Denmark, Copenhagen. We had a Copenhagen sight seeing by bus driven by a Pakistani friendly pilot, who enjoyed speaking in Hindi with us, was a memorable experience of seeing historical architecture of Denmark, change of guards at royal palace, churches, and beautiful harbour.

Visits in Stockholm.....

Sunday, 29th October was used for beautiful sight seeing by bus and boat as well as shopping in Stockholm. Both the sight seeing were *in situ* but got full view and information by head phone commentary about various places of Stockholm, the city of islands.

30th October was very busy visiting KTH, Arla Foods and Indian Embassy.

At KTH –Royal Institute of Technology

In the morning, we were received by Professor Ramon Wyss, Vice President of Royal Institute of Technology (KTH) at the old administrative building. He gave a bird's eye view of the KTH which is the largest technical University in Sweden and among top ten in Europe. The University was founded in 1827 and has 17,000 under graduate and 1500 PhD students, awarding approximately 225 PhD degrees per year. One exciting feature is that KTH offers about 36 masters programs of 1-2 year duration based on a BSc or equivalent. The institute is focusing the areas of IT, BT, pharmaceuticals, materials and nano sciences.

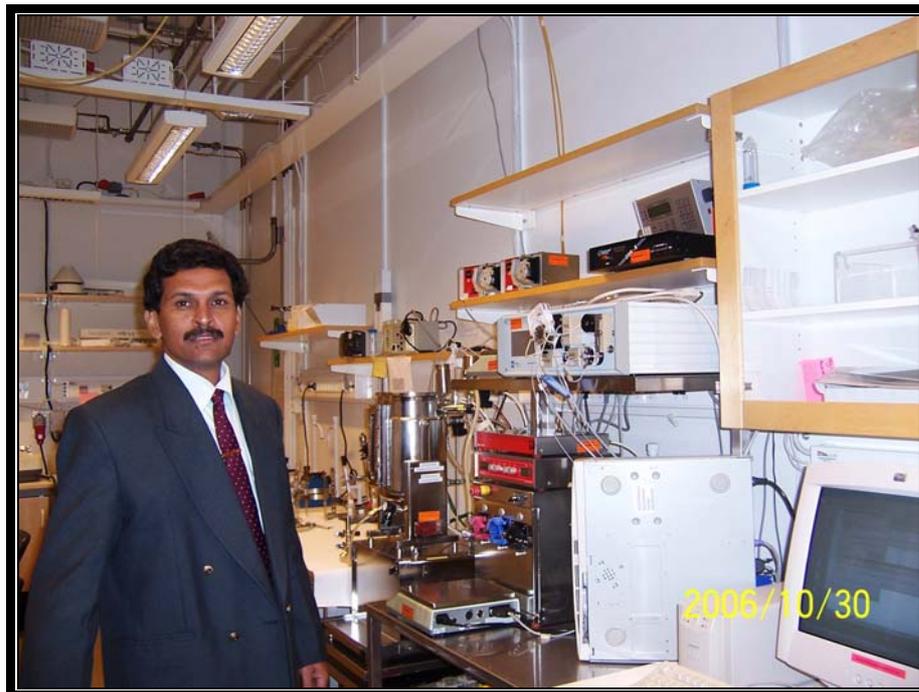


Dr. Ramon Wyss, vice rector KTH received us at the KTH Stockholm

Mrs Alphonsa, International project coordinator then took us for visit to their Biotechnology centre. Dr Gen Larsson, Director of School of Biotechnology briefed us about industry oriented work going on at the centre on protein molecules, metabolites and fermentation technology. She showed us their pilot fermentor plant which also contained a small battery of six 1L fermentors, which is a unique tool for fermentation research. Then we had a quick round of various laboratories related to microbiology, immunology, chemistry, molecular biology and so on.



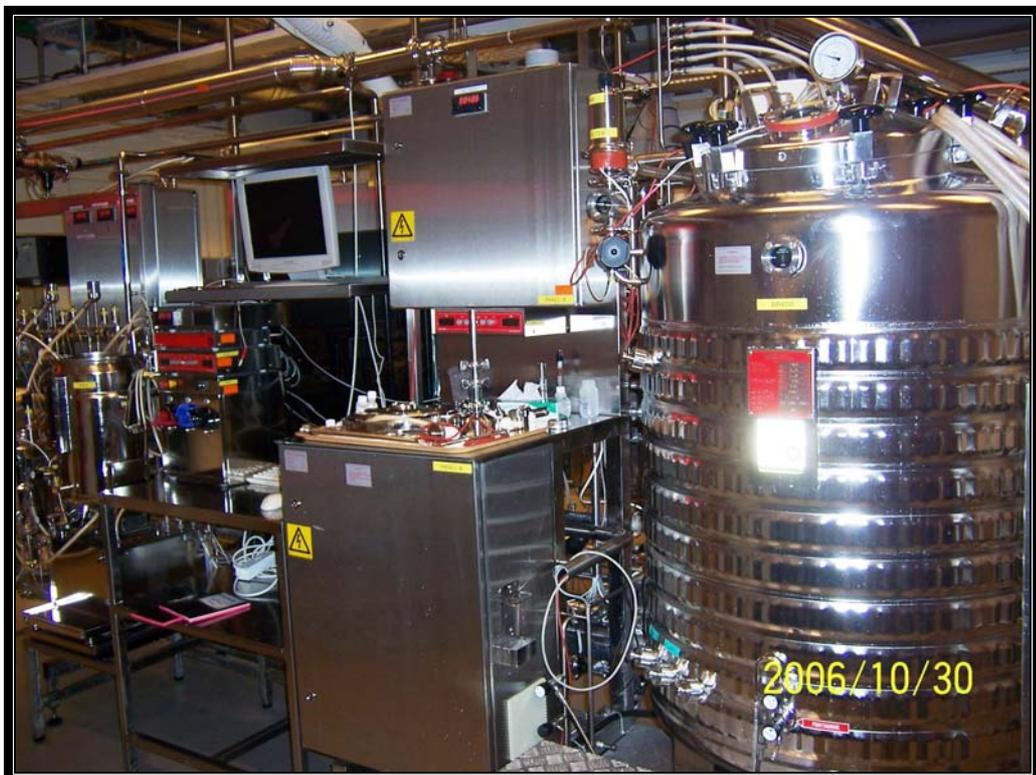
Professor Gen Larsson showed us the pilot plant of the school of biotechnology



Dr. Khedkar in the laboratory of the school of biotechnology



A collection of five lab scale fermentors specially developed by the school of biotechnology for detailed study of fermentation for producing bioactive substances for pharmaceutical purposes.



At Indian Embassy

Mr Rajesh Vaishnav, First Secretary at the Indian Embassy in Sweden received us and then we had a meeting with Her Excellency Ambassador of India, Mrs. Deepa Gopalan Wadhwa. I briefed her about the functioning of SASNET-FF and our purpose of visiting Sweden. Her Excellency was kind enough to offer any help that we need to strengthen our network. She also hosted lunch for our delegation.



At the Indian Embassy with Her Excellency the Ambassador Mrs. Deepa Gopalan



who showed keen interest in our activities at lunch before going to Arla foods in Stockholm.

At Arla Foods

Brief Introduction about the Arla Foods and Consumer Nordic R & D was given by Dr Annika Larson, Head of Department of Food Science. Arla Foods is a Cooperative owned by 12,700 milk producers in Sweden and Denmark. This is Europe's largest dairy company, which received 8.6 million kg milk and have a turn over of Approx. DKK 48 billions. In their mission, the company states that we aim to contribute to consumer health and enjoyment by developing products that provide inspiration, confidence and well-being for modern consumers around the world and that is why Arla invests more than DKK 250 millions per year in innovation. I wish that our Indian Dairy Cooperatives learn something from this!! We had a small visit of Arla's aroma laboratory, microbiological lab and pilot production plant.



Dr Astrid Walles-Genberg and Dr Janet Hakansson gave presentation on the research being conducted at Arla on bioscience and probiotics. Dr Christian Eriksson gave interesting presentation on aroma chemistry, instrument called SNIFF and sensory evaluation of their products. The interesting part is that Arla appoints sensory evaluators from the public after thorough selection, who gives their input in maintaining the sensory profile of Arla foods constant thorough out the year.

Some of the impressions and feelings

Dear Babooji,

We are extremely thankful for all you did for us. Each of the participants expressed gratitude for you and admired your zeal, enthusiasm, energy, activeness, care and all hospitality. You are a wonderful host.

We will come up to your expectations.

Few photographs are attached with this. Kindly let me know successful receipt.

With regards

JB Prajapati

Dear Sir,

I have reached home safely after a wonderful and educative visit at Sweden and Denmark. I have learnt a lot, and from the unsteady steps that I had towards the visit, I still cannot believe that i actually made it and that too after honouring my commitments (it was to the best of my ability under the constraints of time and exposure that i have had till date).

I am thankful to all the members of the group, since we were all compatible and along with the good professional exposure, we had a good time personally too.

I now feel much more obliged to the programmes that are to be conducted under SASNET, and assure everyone of inputs from my end.

Thanks once again, and with best wishes to Mrs. Nair, Nisha and Nila.

Rekha Singhal

Dear Dr. Nair,

I am still in UK; I have been trying to call you over phone. It says-incoming call is not accepted. I don't know how to thank you for all the opportunities we had because of you. I owe my gratitude to you. I will write to you after reaching Mysore that will be on the 5th of Nov. I am leaving this place early morning tomorrow.

My regards to your wife. Once again a very big THANKYOU! Other things will follow till I get saturated saying thank you.

Regards

Vijayalakshmi

Respected Sir,

I very comfortably and safely arrived here in Pusad yesterday (02/11/06) at 16 Hrs.

I don't know by which words should I place on record my deepest sense of gratitude for the painstaking continuous efforts U have exerted since last more than six months for the very systematic, executively-comfortable, very well-planned tour to Europe. My poor vocabulary does not allow me to express the internal feelings for the same. But I must simply say kindly accept my hearty thanks for all U have done to lead our tour as a grand successful. We have learned lot many things and all the credit goes to our Respected Chairman and respected Coordinator, SASNET. I would like to assure what ever the things we have to do for the strengthening of the SASNET I shall do it whole heartedly. Thanks a lot once again,

Yours faithfully,

CD Khedkar

Dear Dr. Nair

Let me express from the deep of my heart how thankful I am for making it possible to visit Denmark and Sweden to participate in the conferences and to attend several of the meetings with the doyens of the industry and Institutions. Each of them has imprinted so strongly in my memory that they will never be erased in the years to come. Every meeting and every interaction was a thrilling experience and that they were all highly educative both in terms of knowledge acquisition and experience sharing. Not a moment passed without being exciting.

In your midst we all became young and active. Many a times I wonder what is the secret of your bubbling energy and it does not seem to decrease even a bit despite of the fact that you are topping all of us in terms of age. I like your word INITIATIVE-LESS-NESS and to extrapolate to the present situation it may look like ENERGY-LESS-NESS to personify your relentless effort to make SASNET-FF the most talked after network.

Although all of us new each other it is during this trip that each of us get to know better and deeper and that made the visit scintillating. The impressions each of us have made our bondage stronger and firmer. I must thank you for this platform. JB's involvement in the planning, execution, foresightedness etc was exemplary and that made the visit much more interesting. I will come back to you with answers to the points raised by you.

My love to your children-Nisha and Nila and respects to Mrs Nair

With warm regards

PA Shankar

Outcomes of the visit and the meetings

1, Established research links

- Between Prof. Kerstin Skog of Lund University Sweden and Prof JB Prajapati of Anand Agricultural University of India involving Padma Ambalam of Saurashtra University India to study the effect of fermentation of the mutagenicity of aflatoxin in foods. A planning grant of 75 000 SEK from Sida/vinnova has already been awarded for preparation of a project proposal.
- Between Prof. Rekha Singhal of Mumbai university institute of chemical technology India and Prof. Rickard Öste of Lund University to study the nutritional properties of the cereal beta Glucans and the microbial beta glucans using invitro and invivo experiments.
- Between Prof. Åsa Ljungh of the medical faculty of Lund University and Padma Ambalam of Saurashtra University of India to study the probiotic properties of certain lactobacillus strains isolated from human epithelium.

2, Proposed research being prepared

- A study of the use of fungus for production of food additives by Dr. Vijayalekshmi of the central Food Technological Research Institute Mysore India to be linked with Prof. Rajni Kaul of the Green chemistry group of the department of biotechnology of Lund University
- A field study of the effect of fermented beverage based on oats on the intestinal micro flora of tribal children by Dr. CD Khedkar of India and Prof. Rickard Öste of Lund University Sweden

3, Proposed projects from India but still with out link in Sweden

- A list of five project proposals are available for reference (please contact the author of this report if interested)

4, Proposed seminars to be conducted

- Öresund food net and SASNET fermented foods propose to organise a seminar in India for promotion of strategic alliance among small and medium sized agro food and biotech companies for development of new products and new markets.
- SASNET fermented foods propose to organise a meeting on higher education and advanced research in food science and biotechnology for development of value added food products based on traditional Indian foods for global marketing.

In addition to the above SASNET FF, Öresund food net, Christian Hansen A/s and Danisco A/S agreed in principle to go further to develop a project on screening of the microflora in the traditional fermented foods of South Asia. This will be conducted in connection with data collection and data base development for fermented foods of South Asia which is being planned by SASNET FF.

Research Link Projects

-proposed and discussed during the last strategic meeting in Sweden and Denmark.

- Data collection database development and screening of micro flora in traditional fermented foods of south Asia. Coordinators Prof. Baboo M. Nair, Lund University and Dr. Jb Prajapati, Anand Agricultural university. Interested collaborators are Dr. Jorgen Holm Oresund Food net, Dr. Olesen Chr. Hansen A/s, Dr. Bech Hansen Danisco A/s. Dr. PA Shanakar Bangalore India.
- Effect of fermentation on the mutagenicity of aflatoxin in food products . Planning grant sanction to Prof. Kerstin Skog Lund University, Dr. Jb Prajapati Anand Agricultural university India. Collaborators are Baboo M. Nair Lund University and Padma Ambalam of Saurashtra university, India.
- Fermentation of oat based beverages and its effect on the intestinal micro flora of the tribal children. Interested collaborators are Prof. Rickard Öste Oatly, Sweden Prof CD Khedkar Maharashtra university of animal sciences Indian Dr. Jb Prajapati Anand agricultural university, India Dr. Åsa Ljungh Lund university, Prof Torkel Wadström Lund University and Baboo M. Nair, Lund University.
- Study if cereal beta Glucans in comparison with microbial Beta glucans. Interested collaborators are Prof Rickard Öste Oatly Sweden and Prof Rekha Singhal, UDCT, University of Mumbai, India.
- Use of fungus to produce food additives interested collaborator in India is Dr. G. Vijayalekshmi Central Food technological Research Institute, Mysore India.
- Isolation and characterisation of ACE inhibitor from the traditional fermented food of India called Idly produced from rice and legume. Interested collaborator is Prof. Rekha Singhal UDCT, University of Mumbai, India

- Isolation of S- Adenosyl L-Methionine from microbes isolated from fermented foods
Interested collaborator Prof. Rekha Singhal, UDCT, University of Mumbai, India
- Production of tannase by microbial fermentation in traditional fermented foods of India.
Interested collaborator Prof. Rekha Singhal, UDCT, University of Mumbai, India.

A list of Collaborative projects Proposed during the earlier strategic meetings

GROUP – A

- Development of cereal based fermented foods for supplement in feeding of women and children.
- Understanding the process technology of fermented foods using khaman as a model.
- Nutritional and molecular characterization of traditional fermented food of Himachal Pradesh.

GROUP – B

- Development of database on fermented foods of India and particularly the region specific lesser known ones.
- Provide scientific base for the health and therapeutic claims of some fermented foods already being marketed.
- To standardize, characterize and develop the technology of some popular fermented foods like Handva, Anarse and Kurdi.

GROUP – C

- Creation of database for fermented foods based on surveys
- To conduct a detailed study on a largely consumed and popular cereals based fermented product - Idli.
- To validate the health claims of dahi/buttermilk as indicated in Ayurveda.

GROUP – D

- Documentation of fermented foods
- Clinical investigations to substantiate health claims of fermented foods
- Need to look into legal aspects for marketing fermented foods.
- Develop a centre to maintain proven isolates.

Acknowledgement

Organisation of the visit, the study tour and the seminars were possible due to the support from SASNET- Lund University, Sweden., EU – Delegation, New Delhi, India., Sida- Swedish Agency for International development co-operation, Anand Agricultural University, India., Central Food Technological Research Institute, Mysore, India., Institute of Chemical Technology, University of Mumbai, India, Karnataka University of Animal and Fishery Sciences, Hebbal, India. , Maharashtra University of Veterinary Sciences, Warud, India. Oresund food net Copenhagen, Denmark., and Oatly AB, Landskrona, Sweden.

We thank all those who have been helpful in making this visit a fruitful one.

Please note that this report is prepared by me taking into account contributions from all the participants.



On the way back home to Mumbai from Stockholm via Zurich