

VATIS UPDATE

Food Processing

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Highlights

- Specialized dairy courses ●
- Fruit-based carbonated drinks ●
- New starch for dairy applications ●
- Long-lasting coconut milk ●
- New palletizer ●
- Hi-tech whole muscle stuffers ●



APCTT

ASIAN AND PACIFIC CENTRE FOR TRANSFER OF TECHNOLOGY

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- APCTT implements regional and inter-regional projects related to technology transfer.

Cover Photo

Australia ranks third in global dairy trade, accounting for about 13 per cent of the world's dairy exports.

Credit: Food & Pack

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**VATIS* Update
Food Processing**
is published 6 times a year to keep the readers up to date of most of the relevant and latest technological developments and events in the field of Food Processing. The Update is tailored to policy-makers, industries and technology transfer intermediaries.

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IN THE NEWS

India participates in Anuga Food Fair

Anuga Food Fair '99 was held at Cologne in Germany from 9-14 October last year. Nearly 190,000 visitors and 6,550 exhibitors from more than 250 countries participated in this event. Thirty exhibitors from India exhibited traditional items such as spices, tea, coffee, grains and some processed food items.

Anuga Foodtec will be held from 11-15 April and Anuga special, the Forum for Regional Specialities, will be from 12-15 October. *Contact: Indo-German Chamber of Commerce, Maker Towers 'E', 1st Floor, Cuffe Parade, Mumbai 400 005, India. Tel: +91 (22) 2186 131; Fax: +91 (22) 2180 523; E-mail: igcc@giasbm01.vsnl.net.in.*

Outlook good for cheese

According to the Australian Bureau of Agriculture and Resource Economics (ABARE), the demand and price outlook for the world dairy market over the next five years is mixed. It is projecting real increases in cheese prices but the outlook for butter is less firm. Also, bulk cheddar prices have not gained from their position prior to the 'bubble' in 1995-96. Spot market prices for SMP are as weak as they have been for a decade and any change in this position is not anticipated. (*Indian Dairyman*, October 1999)

New initiative helps Australia export fresh fruits

'Fruit to Asia' is a cooperative project that will allow Australian fruit exporters to deliver fresh produce in peak condition to markets in Asia and other parts of the world. Food Science Australia and the Australian Fresh Fruit Company (AFFCO) along with OOCL, a major Hong Kong-based shipping company, and Visy Board, a packaging company, are pioneering technology that will facilitate Australian exporters to send produce of consistent quality, superior to that of international competitors. The Institute of Horticultural Development is supporting this project

in the field of controlled atmosphere packaging. *Contact: Dr. Nevin Amos, Australia. Tel: +61 (2) 9490 8333. (Food Facts, Summer 1998/99)*

Sri Lanka to check quality of wheat imports

In Sri Lanka, wheat grain is presently imported by the CWE, milled at Prima (Cey) Ltd., and the flour supplied through the Food Department to bakers to make bread. While normally a standard hard quality wheat is imported – from countries such as the United States, Australia and Canada – any change in this routine creates problems for the bakers because of poor quality bread produced from the imported wheat. To prevent any such irregularities, a technical evaluation committee for evaluation of wheat tenders was set up by the CWE.

Notwithstanding this, poor quality hard wheat was imported on several occasions. Recently, a team comprising a Research Officer from the Agro and Food Technology Division, a Senior Technical Officer from the Process and Plant Engineering Division accompanied CWE officials on a visit to Prima (Cey) Ltd., and evaluated the proceedings at the mill. Wheat grains were tested for protein and energy levels at laboratories in Trincomalee, with separate samples of wheat flour from the same shipment concurrently tested at ITI laboratories. All the reports were submitted to the CWE. (*ITI Bulletin*, Vol. 7, No. 2, February-April 1999)

Expiry date made compulsory

In India, the Central and State governments have made it compulsory for all pre-packaged foods and drinks to mention the expiry date as well as the legend 'Best before...'. The wordings to be printed will have to be in the form: "Best before (date/month/year)" or "Best before within (...months from the date of packaging/manufacture)". (*Processed Food Industry*, August 1999)

Biotech food to be labelled in the United States

According to the United States' Agriculture Secretary, some type of information labelling for

genetically modified (GM) food is likely to occur. The USDA has ordered Monsanto Co., Pioneer Hi-Bred International and other companies developing GM seeds to immediately report any unexpected or adverse effects during field testing. European consumers' resistance to GM foods has not helped exporters in the United States. (Processed Food Industry, September 1999)

Indigenous mill to help India reduce machinery imports

A pilot mill for dry-milling of maize developed in India, by the Central Food Technological Research Institute, could help decrease expensive imports of milling equipment. In India, maize is used as food, animal feed and also as a source of edible oil. About 10 million tonnes of maize is produced in the country – out of which 30 per cent is used as food, 10 per cent for industrial use and the rest for cattle/poultry feed. (Processed Food Industry, September 1999)

Quality processing boosts Indian seafood exports

Nearly 4.3 per cent (US\$1 billion) of India's total foreign exchange for the year 1997-98 was earned through export of quality seafood products. Frozen shrimp accounted for 65.6 per cent of the earnings, followed by frozen fish (15.4 per cent), squids (7.5 per cent) and cuttlefish (6.6 per cent). Quality assurance programmes based on HACCP are being implemented by seafood exporters. (Indian Food Industry, Vol. 18(4), July-August 1999)

Futures Trading Exchange exclusively for soya bean

In India, a Futures Trading Exchange will be set up exclusively for soya bean and its products. The constitution and by-laws for the on-line exchange have already been adopted. Its core secretariat manned by experienced professionals is in place and a well-balanced Board of Directors have been elected. Membership will be open for growers, processors, traders, brokers, importers, exporters, banks and financial institutions.

This exchange will facilitate large/bulk producers/

cooperative bodies to ensure that current prices for future delivery would cover their production costs, by establishing a floor price for soya beans to be sold eventually. This would also attract farmers to expand acreage and yield per acre of soya bean. Processors would be able to use Futures to hedge their gross processing margin, i.e. the difference between the cost of soya beans and the eventual revenue from soya oil and soya meal. (Beverage and Food World, September-October 1999)

On-line auction site

The world's first on-line market place and auction site for the agriculture and food industry has been launched by Food-Trader.com, the United States. The website offers immediate access to over 2,600 product lots from more than 120 countries. To date, more than 50,000 buyers and sellers worldwide have benefited from the website. The site posts lots available for purchase, product specification sheets on every commodity and market price indicators, displays the current price quotes, categorizes products by country of origin and lists current inventory levels. (Processed Food Industry, November 1999)

Study reveals harmless nature of coconut oil

A recent study carried out by the Industrial Technology Institute, Sri Lanka, has shown that coconut oil does not adversely affect human health. This report severely undermines propaganda, by oil importers, that coconut oil is inferior to other cooking oils because of the health factor. Between 1987-97, coconut oil consumption increased by only 20 per cent, compared with a four-fold increase in the use of other cooking oils. (News Digest, Vol. 12, No. 30, 31 August 1999)

Course in tea processing and technology

The Postgraduate Institute of Agriculture University, Sri Lanka, is planning to introduce a Diploma course in Tea Processing and Technology in 2000. This step is being taken to ensure that new technologies introduced to manage tea is utilized efficiently and would help in the growth

of this industry. The 12-month study schedule has been designed to impart in-depth knowledge on both practical and theoretical aspects of tea processing and technology. (News Digest, Vol. 12, No. 35, 15 October 1999)

Specialized dairy courses

The National Dairy Research Institute, Bangalore, India, organizes several specialized training programmes to guide dairy industry personnel and entrepreneurs, every year. The number of participants is restricted to 15 for each course. *Contact: The Head, Southern Regional Station of National Dairy Research Institute, Aduvodi, Bangalore 560 030, India. Tel: +91 (80) 5710 057/663/5711 119; Fax: +91 (80) 5711 119.* (Indian Dairyman, October 1999)

Malaysia to regulate packing and labelling

All fresh produce in Malaysia will have to be graded, labelled and suitably packed as per legislations from the year 2000. The regulations cover vegetables, fruits and flowers – whether produced locally or imported. Grading standards have been set up to ensure that only quality products are marketed. This initiative also prevents dumping of inferior quality agriculture produce from overseas. (Food and Pack, November 1999)

Financial assistance for irradiation facilities

The Indian Ministry of Food Processing will provide financial assistance for setting up irradiation facilities to increase the shelf-life of food products. This assistance is in addition to credit facilities offered by the Technology Development Board (TDB), Department of Science and Technology. Term loans of up to 50 per cent of the estimated outlay of the project would also be offered by TDB. Such loans are repayable at an interest rate of six per cent per annum and require collateral guarantees. Bhabha Atomic Research Centre (BARC) will act as the nodal agency for providing technical know-how. The Board of Radiation and Isotope Technology will also help promoters interested in setting up new facilities. (Indian Food Packer, September-October 1999)

INVENTIONS/ NEW PRODUCTS

Innovative bakery products

The Central Food Technological Research Institute (CFTRI), India, has developed two novel bakery products – onion spiced biscuits and ragi rusk. Small-scale bakery units can easily adapt both these manufacturing processes. Using sponge and dough method, crisp spicy onion biscuits have been produced. Dough ingredients include sesame, finely chopped mixture of onion, green chilli and coriander leaves.

Ragi or finger millet is rich in calcium, protein, fibre and the vitamins thiamine, riboflavin and niacin. Ragi rusk, containing 40 per cent refined ragi flour, has better nutritional value than wheat rusk. Every 100 g of ragi rusk provides 344 mg of calcium and 283 mg of phosphorus, apart from nutritional fibre. (Indian Food Industry, Vol. 18(4), July-August 1999)

Modified starch designed as oil substitute

The National Starch and Chemical Ltd., Australia, has developed a speciality starch for use as a fat mimetic in liquid food systems. N-LITE™ L starch produces solutions that are oily, bland in flavour and exhibit excellent resistance to gelling. It can be used over a broad range of process conditions – high to low acid and shear – together with modified starches that give viscosity development. It is an ideal ingredient for low-fat food products that demand a texture similar to the higher fat original. Specific applications include:

- To impart a rich, creamy mouthfeel to low-fat soups in fresh, frozen or dry mix form;
- Low-oil or oil-less salad dressings, to achieve oiliness without the use of fat; and
- Reduction of fat content in white or cheese sauces, while maintaining a smooth and creamy texture with excellent body.

(Food Digest, Vol. 22, No. 3, July-September 1999)

Fruit-based carbonated drinks

The Indian Agricultural Research Institute, New Delhi, India, has developed a new range of natural health drinks – Pusa fruit drinks. Two types of Pusa fruit drinks are available. The first is fruit-based carbonated drinks whose production technology involves preparation of fruit juice, fruit syrup base and their carbonation. Lime, grape and a new hybrid called LimGra, which has the colour of grapes but tastes like lime, can be used to prepare the drink. The other type of product is fruit nectar. Indigenous fruits like jamun, phalsa and bael fruits can be used to prepare fruit nectars.

Both these ready-to-drink fruit-based beverages are excellent refreshers and do not contain any artificial flavour, essence or colour. *Contact: Dr. D.S. Khurdiya, Principal Scientist, Division of Fruits and Horticultural Technology, Indian Agricultural Research Institute, New Delhi 110 012, India. Tel: +91 (11) 5788 428/5785 214.* (Indian Food Packer, July-August 1999)

Robots ensure speed and accuracy at dairy facility

Tyrstrup Dairy, Denmark, has installed a Univeyor conveying system to pick 14,000 crates of milk and other dairy products. Palletized loads arrive from the dairy's production area on a conveyor as stacks of 32 crates in eight layers. They are automatically unloaded and transferred into the automated picking area. The new system, with four AAB multi-axis robots, reduces the heavy manual handling previously required in chill stores overnight. It provides speed and efficiency along with high levels of accuracy. The system is supervised by a PC controller operating as a server for all operations. Crates measuring 400 x 300 x 270 mm and 400 x 300 x 90 mm can be handled easily. *Contact: Univeyor, the United Kingdom. Tel: +44 (116) 2786 999; Fax: +44 (116) 2787 010.* (Indian Dairyman, November 1999)

New nutrition product

Nutrena (Pvt.) Ltd., Sri Lanka, has launched an advanced nutrition product, Egg Champion,

for layer chickens. The product facilitates higher yield and reduces the cost of eggs. Egg Champion's special formulation increases productivity and lowers the total feed intake of chickens. A key feature of this product is the mycotoxin prevention system that reduces losses from fungal growth. The formulation has been designed to provide eggs with wholesome, rich golden yolks. (News Digest, Vol. 12, No. 29, 27 August 1999)

New starch for dairy applications

The National Starch and Chemical Information Centre, the United States, has introduced a new functional starch for use in dairy foods such as yoghurt and sour cream. Novation® 3600 Native starch can tolerate heat and shear associated while processing pasteurized puddings, desserts, soups and sauces. It also helps reduce melt-down, improve texture and lower overall formulation costs for ice-cream makers.

In fruit preparations, Native starch effectively stabilizes the fruit, allowing reduction of pectin levels and improving the texture. *Contact: National Starch and Chemical Information Centre, 1 Matrix Drive, Monroe, NJ 08831, the United States. Tel: +1 (800) 7974 992; Fax: +1 (609) 4095 699; E-mail: nscinquiry@salessupport.com.* (Indian Dairyman, December 1999)

New tool to maximize data exploitation

The Institute of Food Research in the United Kingdom, has developed a new software tool to extract growth parameters from test data. Microfit runs on a PC under Windows NT, 95 or 98. Apart from predicting parameters such as growth rate, doubling time and lag time, Microfit also offers the following benefits:

- View a graphical representation of microbiological growth data (the growth curve);
- Estimate confidence intervals on these parameters;
- Simultaneously analyse two data sets and compare them graphically;
- Fit a growth model to the data to obtain parameter estimates for: growth rate and doubling

time (μ_m and t_d), lag time (t_{lag}), initial cell count (N_0) and final cell count (N_{max});

- Perform statistical testing on differences between two data sets; and
- Maintain indexes of sets of microbiological growth data.

Microfit was developed during a 4-year MAFF-funded LINK project 'Food Structure and Microbial Growth' with industrial partners Unigate European Foods, United Biscuits Ltd., Sainsbury's Supermarkets Ltd. and DuPont Cereals Innovation Centre. *Contact: Institute of Food Research, Norwich Research park, Colney, Norwich NR4 7UA, the United Kingdom. Tel: +44 (1603) 255 000; Fax: +44 (1603) 507 723. (IFR News, Issue 3, 1999)*

Coconut water concentrates developed in India

Miracle Food Processors International Ltd., Kerala, India, has developed a novel method to prepare concentrates from matured coconut water using spray evaporation technology. The product has a shelf-life varying from 6-24 months, depending upon the degree of concentration and amount of sterilization. These concentrates can be used in the preparation of various bakery products and dishes. The Ministry of Food Processing is planning to extend this technology to process apple, grape, pineapple, passion fruit, etc. and plans to set up a pilot plant. (*Processed Food Industry*, November 1999)

Whey ice cream – tastier and lasts longer

Researchers at the Technical University of Munich, Germany, have developed a new type of ice cream that not only melts more slowly, but also tastes creamier. Skimmed milk powder, an ice-cream ingredient, was replaced with whey in the new product. For this purpose, whey concentrate was heated in a heat exchanger to 80°C and the resulting mass cooled to 5°C, and then cut into particles measuring 4 to 20 thousandths of a millimetre in diameter. The creamier taste is because of the large whey particles, which are about the size of fat globules. (*Indian Dairyman*, December 1999)

R&D IDEAS

Honey-sweetened beverages

Researchers at the University of Nebraska are investigating two honey-sweetened non-alcoholic beverages based on cranberry juice and lemon juice. Other ingredients in these products include ginseng or chamomile. The focus of this study is to determine the effect of honey on the bitterness and acidity in juice beverages; modification or intensification of desirable flavours; and maintaining colour stability over time.

Shelf-life inspections revealed that there is no marked change in the beverage colour, pH, per cent soluble solids and clarity over a period of six months. The amount of sedimentation increased in both beverages, with lemon juice recording the lowest. Both beverages were microbiologically stable during storage. (*Food Digest*, Vol. 22, No. 3, July-September 1999)

Milk-based drug for haemophiliacs

Researchers at Virginia Polytechnic Institute, the United States, are striving to develop a life-saving drug for haemophiliacs from the milk of genetically engineered cows. Haemophilia is a blood disorder wherein severe bleeding occurs even in case of minor injuries as the blood does not clot quickly. Though satisfactory results have been obtained, further work is required before commercialization. (*Indian Dairyman*, December 1999)

New process for continuous milk coagulation

Scientists at the National Dairy Research Institute, India, have developed a novel process for continuous coagulation of milk using Transverse Jet Mixer-Reactor (TJMR). This method offers continuity in operation and could be easily integrated in any large-scale cheese facility. The system involves micro-level mixing with the help of TJMR specifically designed for this purpose. This innovative stage eliminates the need to agitate the mass once coagulum formation is initiated. (*Indian Dairyman*, November 1999)

Novel approaches to immunoassay of food contaminants

Researchers at the Institute of Food Research, the United Kingdom, have devised three new approaches to produce antibodies and control their properties during the development of immunoassays for pesticides and veterinary drugs. Benefits of the new strategies include:

- New, broader specificity ELISAs for organophosphate pesticides and beta-lactam antibiotics are possible following the successful development of antibodies that mimic broad specificity recognition sites;
- The problem of narrowly specific antibodies raised against sulphonamide drugs can be solved; and
- Using recombinant antibody technology, antibody binding properties can be altered by mutation.

Contact: Institute of Food Research, Norwich Research Park, Colney, Norwich NR4 7UA, the United Kingdom. Tel: +44 (1603) 255 000; Fax: +44 (1603) 507 723. (IFR News, Issue 3, 1999)

Cryogenic rapid egg cooling

Food poisoning from consuming eggs or egg products have forced the industry to reduce the microbial load in and on eggs. *Salmonella enteritidis* (SE) positive flocks produce contaminated eggs at the rate of 1 egg per 10,000 in the United Kingdom or 2.59 eggs per 10,000 in the United States, with eight or less organisms. Recent research has shown that SE proliferation reduces with decreased internal temperatures, and at about 7°C the organism stops replicating.

Researchers at North Carolina State University, the United States, have reported that the use of carbon dioxide (CO₂) gas reduces egg temperature quickly, improves quality and inhibits microbial proliferation. In this process, eggs were exposed for a short period to temperatures below -50°C and then packed. Studies show that the physical quality of the eggs is retained. Development of shell cracks was prevented by not allowing the CO₂ snow to come into direct contact with the shell surface. (World Poultry-Elsevier, Vol. 15, No. 4, 1999)

SAFETY/ QUALITY CONTROL

Colorimetric assay to detect adulteration in cow ghee

Researchers at the National Dairy Research Institute (NDRI), Haryana, India, have developed a colorimetric method to detect the presence of buffalo ghee in cow ghee. Cow ghee is considered to be superior to buffalo ghee and at present there is no test to detect adulteration of the former. As both types of ghee have different colour characteristics, the colorimetric assay measures the colour intensity of any given sample at a particular wavelength. About 2 ml of the sample is dissolved in 5 ml of a solvent mixture, containing acetone and benzene in the ratio 3.5:1.0, and the absorbance is measured at 45°C and 440 nm wavelength. A simple equation based on regression analysis is being developed to determine the level of cow ghee. (Indian Dairyman, December 1999)

Non-destructive testing of UHT milk products

Elecster Oyj, Toijala, Finland, has developed a new computerized system for non-destructive testing of UHT milk products, including infant formulas and flavoured milk. ElecTester MK IV, tests 125-1,000 cc UHT brick-type cartons by scrutinizing the hydrodynamic behaviour of the contents at high speeds. Operated by a foot switch, the system is initialized by automatic start-amplitude and reference-value settings. Graphics include a high-quality colour display, showing actual measurement values.

The system facilitates testing at reduced cost as the cartons are not opened or damaged. Acceptance limits can be adjusted and rejection is indicated by both audio and visual signals. It can be further automated by linking it to an Automatic Testing Station. Contact: Mrs. Eliisa Koro, Elecster Oyj, Fin 37801, Toijala, Finland. Tel: +358 (3) 541 211; Fax: +358 (3) 5412 400; E-mail: sales@elecster.fi. (Indian Dairyman, December 1999)

Metal detection in food

Lock Inspection Systems has launched its new MET30+ range of metal detectors that offer enhanced performance in wet and dry applications. Important features include improved ruggedness to perform in aggressive cleaning environments of food factories and simplified service and support. An upgraded 32-bit processor increases processing speed by 500 per cent and speeds up signal interrogation to more than 60,000 events per minute. A combination of selectable range of frequency oscillators and new linear phase circuitry provides high-quality signal stability. Additional features include: a twelve language menu, product autolearn, product tracking and full communication ports. An enhanced on-board memory with Lock's standard software incorporating an automatic facility for switching to metallized film operation offers greater flexibility in product applications. (Food and Pack, September 1999)

Casein analyser

A researcher at Massachusetts Institute of Technology (MIT), the United States, has developed a casein analyser that can measure both casein and fat using a laser beam. This system has been incorporated in OL-8000 automatic cheese milk standardizing system from On-Line Instrumentation Inc. The analyser is impervious to moisture or temperature changes and ensures accurate casein/fat ratio, yield prediction and FDM. It also monitors total solids, thereby facilitating maximum plant throughput to be achieved. (Indian Dairyman, November 1999)

Biosensor to improve food safety

A new device that can detect at least six microorganisms in food items has been developed at the Georgia Tech Research Institute (GTRI), the United States. The new biosensor can identify the species as well as determine the concentrations of multiple pathogens – including the deadly *E. coli* 0157:H7 and *Salmonella* – in food products within two hours. The most significant advantage of the biosensor is the speed in assessing the presence of contaminants.

Laboratory tests have shown that the biosensor is extremely sensitive. It can detect pathogens at levels as low as 500 cells/ml and researchers hope to further improve the device's sensitivity to 100 cells/ml. Current laboratory methods only achieve sensitivity levels of 5,000 cells/ml, and they usually take 8-24 hours to yield results. In addition, lab equipment costs US\$12,000-US\$20,000 per instrument compared to an estimated US\$1,000-US\$5,000 for a biosensor.

The biosensor can simultaneously detect 12 different pathogens, but researchers are concentrating on six bacterial species for now. They are *Salmonella*, *E. coli* 0157:H7, generic *E. coli*, *Listeria monocytogens*, *Campylobacter jejuni* and *Yersinia enterocolitica* (found primarily in red meat). All these pathogens are associated with stomach illness in humans. (PTI Science Service, 16-30 November 1999)

Measuring egg shell stiffness

Researchers at the Laboratory for Agricultural Engineering, Belgium, have reported a new method to test egg shell quality based on vibration response when the egg is excited by a non-destructive impact. The impact is provided by a small hammer applied at the equator of the egg, resting on a support with a microphone attached. The response heard by the microphone is immediately passed on to a computer for analysis and recording. The output data included resonant frequencies (RF), which were positively and significantly correlated with egg shell thickness.

The new method requires only three seconds to test an egg and hence is an ideal system for breeders and researchers who have to measure large quantities of egg in a short time. Also, the egg is not destroyed and can be used for either consumption or incubation. *Contact: Mr. P. Coucke, Laboratory for Agricultural Engineering, K.U. Leuven, Kardinaal Mercierlaan 92, B-300 Heverlee, Belgium.* (World Poultry-Elsevier, Vol. 15, No. 8, 1999)

Smart tongue to detect spoiled foods

A tiny electromechanical device capable of

detecting spoiled foods – a microprocessor tongue – has been devised in the United States by Mr. Vijay and Mrs. Vasundara Varadan. The new sensors offer three distinct benefits over chemical counterparts, namely:

- These small units are made from silicon, quartz and aluminium, thereby reducing production costs;
- They receive power and transmit their readings by radio waves or microwaves and can be placed in milk cartons, flush against helicopter rotors, inside pipelines, etc.; and
- They can detect chemical changes without performing any chemical reactions – by detecting changes in viscosity as well as electrical and acoustic properties.

The unit comprises two pairs of intermeshed combs sandwiched between a thin layer of SiO₂ and a slab of quartz. When connected to an antenna, e.g. a 1 cm spiral of A1 foil, each comb will tune into any radio signal whose wavelength matches the space between its tines. At the right tones, the combs begin to shake back and forth and love waves return to the combs where their vibrations are converted back into an electrical signal and sent out through the antenna.

Chemical measurement takes place during the love waves' round trip through the top layer of silicon. Those exposed to the fluid will be slightly slower and weaker than those that were shielded. The difference registers in the device's radio transmission, which a scanner compares to a database of normal values. Once calibrated, the sensors can easily distinguish between slightly spoilt fruit juice and fresh-squeezed juice, ice from water and tap water from distilled water. (Food Digest, Vol. 22, No. 3, July-September 1999)

New Fund to Advance Food Processing Industry

Industrial Development Bank of India (IDBI) will set up a new fund to advance the country's food processing industry. The fund's aim includes upgrading food processing units to international standards, reducing post-harvest losses, and commercialization of research and development results. In addition, a Codex laboratory will be set up to deal with research and development on food standards and analysis.

Source: Beverage & Food World, Sep-Oct, 1999

STANDARDS/ CERTIFICATION

New and revised Indian food standards

IS 966: 1999 → Desiccated coconut – Specification (second revision), Gr 3.

IS 5887 (Part 4): 1999 → Methods for detection of bacteria responsible for food poisoning: Part 4 Isolation and identification of *Clostridium perfringens* (*Clostridium welchii*) and *Clostridium botulinum* and enumeration of *Clostridium perfringens* (second revision), Gr 2.

IS 5887 (Part 7): 1999 → Methods for detection of bacteria responsible for food poisoning: Part 7 General guidance on methods for isolation and identification of *Shigella*, Gr 3.

IS 12207: 1999 → Agricultural tractors – Recommendations on selected performance characteristics (first revision), Gr 2.

IS 13862: 1999 → Tea – Determination of water extract (first revision), Gr 2.

IS 14683: 1999 → Agricultural tractors and machinery – Lighting devices for travel on public roads, Gr 2.

IS 14702: 1999 (Superseding IS 10147: 1982 and IS 10165: 1982) → Sunflower oil cake as livestock feed ingredient – Specification, Gr 1.

IS 14703: 1999 → Vinegar – Specification, Gr 3.

(Standards India, Vol. 13, No. 6 and 7, September and October 1999)

New international standards

ISO 2450: 1999 → Cream – Determination of fat content – Gravimetric method (Reference method).

ISO 3596-2: 1988/Amd. 1: 1999 → Animal and vegetable fats and oils – Determination of unsaponifiable matter – Part 2: Rapid method using hexane extraction – Amendment 1.

ISO 7925: 1999 → Dried oregano (*Origanum*

vulgare L) – Whole or ground leaves – Specification.

ISO 13690: 1999 → Cereals, pulses and milled products – Sampling of static batches.

(ISO Bulletin, November 1999)

Labelling of vegetarian/ non-vegetarian food

In India, the Central Committee for Food Standards has stipulated that packages of food items containing meat-based products or eggs as ingredients should be labelled. This initiative is the result of recommendations made by a committee constituted by the Ministry of Food and Consumer Affairs. The committee was formed to examine proper labelling of food, cosmetics and medicine packages.

A separate symbol and colour code to differentiate foodstuffs containing vegetarian (V) and non-vegetarian (NV) ingredients has also been proposed. A draft notification would be issued in the near future. After scrutinizing feedback to the draft, the government will issue a final notification. (Indian Food Industry, Vol. 18(5), September-October 1999)

Processors to label GM food

In Australia and New Zealand, labelling of food produced using gene technology and foods containing genetically modified (GM) ingredients has been made mandatory. Food processors in New Zealand have warned that the cost to industry of monitoring ingredients and labelling all GM foods would total about US\$80 million per year. In Japan, food processors are rejecting GM ingredients, primarily corn and soya beans, to avoid incurring the cost of labelling and consumer reluctance to buy such food.

Even in other parts of the world where labelling of GM food has not been made mandatory, manufacturers are avoiding GM ingredients to prevent future hassles. Scientific concerns over GM crops include whether the process inadvertently increases natural toxins or decreases nutrients in some foods. It is also apprehended that one or more of the new proteins in such foods could cause allergic reactions. (Beverage and Food World, September-October 1999)

PRESERVATION

Whey protein films to preserve food quality

Researchers at the Northeast Dairy Foods Research Centre, University of Vermont, the United States, have investigated into the benefits of coating beef products with edible films based on whey protein concentrate (WPC). They found that the film helps meat retain moisture during heating. Moreover, when antimicrobial agents were added to the film system, the growth of pathogenic and spoilage microorganisms, including *Listeria monocytogenes*, was inhibited.

Researchers dipped beef frankfurters in a WPC solution containing acetic, lactic and sorbic acids and dried it under forced air. These were then vacuum packed in plastic bags and stored at 4°C and 13°C, along with controls. They were tested after 3, 10, 17, 26, 39 and 60 days for firmness, springiness, juiciness, freshness and colour. Moisture content, pH and texture were also monitored. Results have shown that the edible coating, about 0.07 mm thick, did not cause any noticeable texture or appearance change in the samples. The coated samples were more fresh than the controls and the best results were achieved when stored at 4°C. (Food Digest, Vol. 22, No. 3, July-September 1999)

Long-lasting coconut milk

Researchers at the Food Technology Centre in Singapore have applied heat pasteurization to extend the shelf-life of coconut milk. The team fed raw coconut milk into a continuous pasteurizer and evaluated the time and temperature required for pasteurizing the milk without affecting its taste and consistency. Suitable stabilizers were also incorporated to prevent the separation of fat from the liquid. Compared with raw coconut milk, which has a shelf-life of 2-3 days when stored between 3°-4°C, pasteurized coconut milk lasts for 15 days under chilled storage. *Contact: Singapore Productivity and Standards Board, PSB Building, 2 Bukit Merah Central, Singapore 159 835. Tel: +65 2786 666; Fax: +65 2786 667.* (Productivity Digest Supplement, September 1999)

Anti-freeze door heater for cold storages

Popular Laboratories Pvt. Ltd., Mumbai, India, is offering anti-freeze door heaters for defrosting ice that accumulates on the doors of deep/blast freezer rooms. At temperatures below 10°C, moisture condenses to form ice throughout the freezer room. At times, the door gasket gets torn when opening jammed doors and allows cold air to leak out, leading to higher power consumption. The heater can prevent this loss as it is designed to fit on the door frame, below the gasket, preventing any ice formation. Fabricated from an alloy, the heater is durable and fully waterproof. It is also safe as it operates at a low voltage of 24 volts. *Contact: Popular Laboratories Pvt. Ltd., 217, Raja Rammohan Roy Marg, Mumbai 400 004, India.* (Indian Food Industry, Vol. 18(4), July-August 1999)

Hi-tech cold storage

Viessmann GmbH, a German panel producer, has installed cold storage units on Deutschland, a five-star ocean cruiser. The cold storages have about 7,910 ft³ of ICI's eco-friendly polyurethane (PU) rigid foam insulation sandwiched between 47 tonnes of stainless steel. The fourteen walk-in cold storage units store food needed for 260 crew members and up to 600 passengers at temperatures between 6.6° to -14°C. These steel units occupy a floor area of 1,025 m² and provide 2,100 m³ of cold storage volume.

Viessmann's Tecto sandwich panels have been assembled by the tongue-and-groove system. Several corrosion-proof cam locks, protected in plastic casings and foamed-in-place in the PU core layer, tightly join the sections and allow fast and simple installation. In Deutschland, 592 panels were joined by 5,380 cam locks. For the jointless floors, high-grade steel with an embossed, non-slip surface have been used. The overlapping floor elements were riveted and completely welded together. Door sealing lips can also be removed and cleaned. The storage units fulfill hygiene legislations in the United States. *Contact: Viessmann GmbH, Germany. Tel: +49 (9281) 814 292; Fax: +49 (9281) 814 109.* (Popular Plastics and Packaging, November 1999)

MACHINERY/ EQUIPMENT

Oil filtration and transfer unit

Ace Automation Engineers, New Delhi, India, is offering an oil filtration and transfer system to filter contaminated oil having viscosity up to 1,000 cSt (4,545 SUS). The unit facilitates off-line filtration and recirculation without shutting down the machine. It is also ideal for transferring oil from drum to the machine reservoir as filtration takes place during the shifting process. The unit comprises a hydraulic gear pump having flow capacity of 16-60 l/m, an electric motor of single or three-phase, intake filter of 100 m, magnetic filter, delivery filter of up to 10 m and flexible hoses with rigid end connections. A fine filter of up to 3 m is optional. All the filters have clogging indicators.

Data analysis indicate that 75 per cent of all hydraulic system failure takes place primarily due to contaminants present in oil, which work as abrasive agents and accelerate wear and tear of the components. *Contact: Ace Automation Engineers, C-10, Kirti Nagar, New Delhi 110 015, India.* (Indian Food Industry, Vol. 18(3), May-June 1999)

Tender coconut cutter

Researchers at Kelappaji College of Agricultural Engineering and Technology, Kerala, India, have developed a simple tender coconut cutter. In the traditional method, tender coconut is held in one hand and struck with a heavy knife or machete to cut it into two parts, which requires considerable skill. The new equipment consists of a base, a stand, a swivelling head, a blade and a hand lever. The coconut is placed such that its longitudinal axis is radial to the stand. The knife is lifted, placed on the coconut and pressed down with a downward thrust, thereby slicing the coconut into two halves. (Processed Food Industry, August 1999)

New coating and frying line

Symetec, Australia, is offering the Econo range

of equipment, built in the United Kingdom. It includes the new robust 200 mm batter, bread crumb coating line and 200 mm electrically heated fryer. Fabricated with stainless steel, the systems have IP67 electrical control boxes and are entirely water hoseable for cleaning.

In Econorobe, the batter applicator, the product is carried into the batter dip by an adjustable height hold-down conveyor. The absence of curtain or pumping makes Econorobe suitable for tempura as well. An adjustable air-knife blows off excess batter before transfer to the crumbing machine. The product is placed on a bed of crumb in the Econocrumb system and passed under a crumb curtain. The product exits the curtain and passes under a soft rubber roller to lightly press the crumb into the batter. The product then passes under another air-knife with enclosure curtains to blow off excess crumb in a contained area.

Econofryer is electrically heated with immersed elements for efficient heat transfer. This method transfers 95-98 per cent of heat directly to the oil and is more efficient than gas-fired fryers which can only achieve a maximum of 66 per cent heat transfer. *Contact: Mr. Shaughan Syme, Symtec, Australia. Tel: +61 (2) 9939 4900; E-mail: ssyme@symetec.com.* (Food and Pack, August 1999)

New palletizer

Krones AG, Germany, is offering the Kettner Pressant compact layer palletizer for trays and cartons. The lower and medium output ranges handle pallets (1,200 x 800 mm and 1,200 x 1,000 mm) with short and long-side leading. Outputs up to 150 layers/h can be achieved. It also loads non-returnable packs such as cartons and trays layer by layer on to the pallets. Some key features of this system include:

- Sturdy modular system;
- Frequency-controlled loading plate and row pusher drives; and
- Cross conveyor, pneumatically controlled centring rails.

Contact: Krones AG, Presseabteilung, BohmerwaldstraBe 5, D-93068 Neutraubling, Germany.

Tel: +49 (94 01) 70-0; Fax: +49 (94 01) 703 496. (Packaging India, June-July 1999)

New filling technology

Makram Pty. Ltd., Brisbane, Australia, has launched an innovative drive system designed to reduce equipment cost, achieve automated precision filling and minimize changeover time. A three-phase electric motor has been incorporated into two new filling machines and an up-graded piston filler. Functioning like a stepper motor, the new drive features sufficient spare outputs to control other operations. Fitted to the new Makram Midway Rotary Cup filling and sealing machine, the new motor has considerably reduced the price, compared to the mechanical counterpart. By eliminating the standard Geneva drive that indexed the table, the new drive uses its surplus outputs to control the machine's pneumatic functions. The stainless steel Midway operates on 415 V three-phase power using a clean supply of 6 bar compressed air. (Food and Pack, September 1999)

Water purification equipment

In Australia, Goninan Distillation Systems has awarded a contract for supplying water purification operation control system assemblies and stainless steel cabinets, to house the machines, to SMC Pneumatics Pty. Ltd. and SMC Manufacturing Pty. Ltd., respectively. The purification system combines vacuum and energy-recycling technologies into a single process to produce potable water from water sources including sea, bore and other mineral-contaminated waters.

The unit operates in a continuous process – Vacuum Mechanical Vapour Recompression (VMVR) evaporation. Feed liquid with minimal or no pre-treatment enters a plate heat exchanger where it is heated by the outgoing distillers and residual concentrates. Heated feed liquid is then transferred to an evaporation chamber where, under vacuum, it is brought to boil at a relatively low temperature (40°-70°C). The resulting vapour is separated from the concentrated liquid residue, repressurized in a compressor and returned through a second heat exchanger within the evaporation chamber. At this point, it condenses while giving up its latent

heat to boil the next intake of feed liquid. Both condensate and concentrate exit the process through the initial heat exchanger, giving up their remaining heat to the incoming feed and completing the highly efficient energy loop. A process that ensures consistent water quality and taste, regardless of the source water supply, has also been developed.

Compared with other systems, VMVR machines are more compact and require less energy to produce quality water with little or no pre-treatment of the feed. No filters or membranes are used. The ECO 5000 and ECO 10000 models can produce up to 5,000 l/d and 12,000 l/d, respectively, of potable water. *Contact: SMC Pneumatics, Australia. Tel: +61 (2) 9354 8222; Fax: +61 (2) 9894 5719; E-mail: mktg@smcaus.com.au. Or SMC Pneumatics (NZ), New Zealand. Tel: +64 (9) 730 900; Fax: +64 (9) 5730 905.* (Food and Pack, June 1999)

Hi-tech whole muscle stuffers

Metalquimia S.A, Spain, has introduced automatic whole muscle continuous vacuum stuffers. Twinvac has been designed to vacuum stuff big pieces of any kind of meat, in a continuous way and obtain a finished product with better quality and muscle appearance. It can work in a fully automatic mode, coupled with standard continuous clippers or thermoformers. Continuous stuffing of any kind of whole muscle meat can be done either in single pieces, or long bars to facilitate slicing.

Another system, Auvistick, has been designed for processing marinated meats. Spray injection of any type of brine or marinade into the meat is easily achieved with even distribution and minimal dripping loss. *Contact: Metalquimia S.A., Sant Ponç de la Barca s/n, 17007 Girona, Spain. Tel: +34 (972) 214 658; Fax: +34 (972) 200 011; E-mail: info@metalquimia.com.* (World Poultry-Elsevier, Vol. 15, No. 9, 1999)

Flat top belts

Intralox has launched the 1800 series of flat top belts to meet poultry industry's demand for improved system sanitation and impact resistance. The 1800 series' easy-to-clean design enables

fast, thorough clean-up in less time and at reduced costs. The large 2.5 inch belt pitch and 1 inch transverse pitch means 50 per cent fewer hinge pockets overall. The hinge openings are large enough to allow spray to reach top and bottom surfaces. The belt's drive-bar runs the width of the belt, forcing wash water and debris off the surface. *Contact: Intralox. Tel: +61 (18) 128 742/+64 (80) 449 173.* (Food and Pack, December 1999)

New breeding machine from the Netherlands

Crumbmaster – from Koppens B.V., the Netherlands – is a new type of breeding machine that can handle both coarse and fine crumbs. Based on a unique patented design that keeps crumb breakage to a minimum, the system ensures consistent product quality and appearance. *Contact: Koppens B.V., P.O. Box 1, 5760 AA, Bakel, the Netherlands. Tel: +31 (492) 349 349; Fax: +31 (492) 342 985.* (World Poultry-Elsevier, Vol. 15, No. 9, 1999)

Equipment for mango processing industry

Indian Institute of Horticultural Research, based in Bangalore, has designed several machines to facilitate primary processing of mango for making pickles and chutneys efficiently and hygienically. The machinery include raw mango grader (2 t/h), slicer (1 t/h), cube cutter (0.5 t/h) and peeler and grater (1 t/h). While the grader, slicer and cube cutter can be used to increase production capacity with the limited space and labour available in the pickle industry, the peeler and grater accomplishes the same objective in the chutney and mango powder sector.

Pilot-scale studies have shown that these novel systems could reduce labour requirement by 16 per cent and primary processing costs by 50 per cent. The Agricultural Engineering section has fabricated and supplied a raw mango slicer to a large-scale pickle manufacturer. Detailed drawings and technology for manufacture and installation of these equipment on cost basis are available. (Indian Food Packer, September-October 1999)

PACKAGING

Test unit for aluminium packaging

Gauging devices have helped aluminium can manufacturers retain a competitive position in the packaging field. The smallest of reduction in can wall thickness can make a large difference to the bottom line of the manufacturer and in recent years, there has been a substantial reduction in wall thickness while retaining the integrity of the container.

Versatile Technology, Melbourne, Australia, is offering a test unit to provide accurately repeatable readings with a 10 per cent tolerance. As can manufacturers' permissible wall thickness tolerance is ± 3.8 microns, the test equipment must be accurate to within 15 per cent – 0.8 micron. The new unit applies Solartron digital probes to provide for 10 per cent tolerances. Each system is tested for gauge repeatability and reproducibility before shipping. (Food and Pack, August 1999)

Packaging tomatoes

Barry Oakley Packaging Consultancy CC, South Africa, is offering cartons for packaging tomatoes. The carton has a footprint of 230 x 457 mm and a closed height of 130 mm. There are only two wooden components: the end and central vertical component – 120 x 220 x 10 mm and the planks used for the top, bottom and side components – 85 x 457 x 5 mm. Six planks are used per carton – two each on the top and bottom and one on each side. Some advantages of this carton include:

- Less fruit contact and compression from vibration during transport;
- Easier handling in the total logistics chain;
- Less impact damage on the fruit; and
- Better quality of product reaching the market, hence leading to good prices.

For grower identification, a paper label listing the farmer's brand name, grade variety, etc. is affixed at one end. *Contact: Barry Oakley Pack-*

aging Consultancy CC, P.O. Box 17525, Sunward Park, 1470, South Africa. Tel: +27 (11) 9133 880; Fax: +27 (11) 9132 418. (Packaging India, April-May 1999)

Gable-top packaging and stretch-blow moulding

Tetra Pak, Sweden, has introduced its latest gable-top packaging machine (Tetra Rex) and Tetra Plast, a stretch-blow moulding system. Tetra Rex TR/18 ESL has been designed to maximize filling capacity, minimize product loss and downtime. It is capable of extending the shelf-life of quality products – e.g. low-acid dairy products can now be stored up to 90 days at 4°C and high-acid products for more than 90 days. It can also process up to 14,000 cartons per hour and an optional integrated opening device applicator is available. A servo-driven diaphragm has been used, rather than the traditional cam-driven system, to ensure filling accuracy. The straight-line dispensing system can purge any air that could cause inconsistencies in fill weights. Aseptic valves and the Interface Valve Group (IVG) reduce operator handling and prevent product line contamination. Efficient carton sterility helps protect against *Listeria*, *E. coli*, yeast, *Salmonella*, mould and psychotropic spoilage organisms. Options available along with Tetra Rex include foaming and sanitizing unit, separate cleaning unit, flip cap applicator and automatic carton loader.

Tetra Plast stretch-blow moulding series includes the X-2 and X-6 machines which facilitates both plastics and carton packaging. The double cavity X-2 machine has been designed to accommodate a large range of preform shapes to produce complex bottles of up to three litres at a rate of 3,000 bottles/h. The new flexible servomotor stretching system is linked to the pre-blowing pressure valve. A touch screen interface allows easy programming. Up to 50 production "recipes" can be pre-set, saved and quickly recalled. The heating system is controlled by an infrared camera. Preform carriers and adjustable infeed rollers can minimize changes in setting operations. Tetra Plast X-6 has a nominal capacity of 6,000 bottles/h and a special transport system for preforms has been designed. The transport

system has one line infeed and six parallel lines through the heating section. (Food and Pack, September 1999)

New packaging material for fruits and vegetables

Supreme Industries Ltd., New Delhi, India, has developed a new packaging material for fruits, vegetables and other horticultural products. In one metre of the tubular poly foam netting (Fomgard), 20 big apples or 10 big mangoes can be packed by cutting the netting tube into the required size. Fomgard offers several benefits such as:

- It is attractive, light-weight, tough and flexible;
- Facilitates easy packing or unpacking;
- The product is visible even though unpacked;
- Hygienic, non-toxic, odourless and fit for packaging food products; and
- Economical and re-usable.

Contact: Mr. A.K. Malhotra, Deputy General Manager, The Supreme Industries Ltd., 518, Osian Building, 12 Nehru Place, New Delhi 110 019, India. (Food Digest, Vol. 22, No. 3, July-September 1999)

Air/sea-worthy packaging

AES Packaging, Chennai, India, is offering resinex super slippery grade high-performance stretch film (SSHPSF) and advanced automatic stretch wrapping machine with ISO 9001 CE quality standard for various export products. After primary packing, the consignments are placed on a wooden pallet and wrapped with the stretch film, which holds the shipment together and protects them. The super slipper grade stretch film wrapped pallet becomes stone hard, tamper-proof and can be easily loaded and transported without the need for any container. The film prevents damage during transit and is resistant to moisture and dust.

This economical packaging conforms to any irregular shape and facilitates easy customs checking. The film is manufactured by AEP Packaging, the Netherlands. *Contact: AES Packaging, 72 Dhargh Road, Pallavaram, KIS, T2, Laxmi*

Enclave, Chennai 600 043, Fax: +91 (44) 2367 616. Or AEP Packaging, the Netherlands. Fax: +31 (55) 5996 533, 5996 555, 5058 840; E-mail: rmasselink@aepnl. (Indian Food Industry, Vol. 18(5), September-October 1999)

Bulk packaging revolution

Amcor Flexibles has developed Boss Pak, the latest in bulk food packaging. Boss Pak provides several unique features including a protective barrier against oxidation or odour profiling of food products. It is popular with milk powder manufacturers and can be used to package up to 1,000 kg of dry goods like sugar, salt, agricultural chemicals and resins that require barrier protection. An internal reinforcement ring is an additional feature that makes it into a square shape when filled. This facilitates container loading for export, general transport and storage space savings. (Food and Pack, October 1999)

New vertical form-fill-seal bagmaker

Woodman Company, the United States, has introduced its next generation continuous motion vertical form-fill-seal bagmaker. Designed as a "global machine" using metric dimensions, components, fasteners and electrical specifications, it incorporates a unique sealing motion based on a hypocycloidal geometric path. This motion generates a linear output from a circular input to provide extended parallel bag sealed well at high speeds. As a result, greater packaging speed capability with high seal integrity on a broad range of packaging materials and products is achieved.

Cyclone includes full servo control for both the end-seal drive and film pull belts. Its simplified film path with powered film unwind and automatic web tensioning optimizes bag registration. Speeds up to 200 bags/m are possible, achieving high output within a compact footprint. All machine functions are controlled by a high-performance, microprocessor-based real-time operating system that provides total system control, diagnostics and remote connectivity options. *Contact: Woodman Company, the United States. Internet: <http://www.woodmancompany.com>. (Food and Pack, October 1999)*

RECENT PUBLICATIONS

Dairy India 1997

This 900-page compendium lists more than 70 articles on a wide range of topics. Details of more than 7,000 organizations have been listed. Project profiles, buyer's guide, who's who, latest trends, growth projections, market data and many other useful information have been provided.

Contact: Dairy India Yearbook, A-25, Priyadarshini Vihar, New Delhi 110 092, India. Tel: +91 (11) 2243 326; Fax: +91 (11) 2243 039; E-mail: yearbook@giasdl01.vsnl.net.in.

Yoghurt: Science and Technology

This second edition provides information on the introduction of mild-tasting 'bio-yoghurts' that has changed both consumer markets and manufacturing practices. Some of the topics include:

- Background to manufacturing practice;
- Processing plants and equipment;
- Microbiology of yoghurt and 'bio' starter cultures; and
- Biochemistry of fermentation.

Contact: Woodhead Publishing Limited, Abington Hall, Abington, Cambridge CB1 6AH, the United Kingdom. E-mail: wp@woodhead-publishing.com.

Bake a good impression

This brochure discusses speciality food starches designed to enhance the flavour, texture, shelf-life and processing of a variety of baked products. Topics covered include: bakery fillings for cream and fruit pies and doughnuts; dry mixes for cakes and muffins, brownies and cookies; and ingredients for jellies, cookies, icings and frostings.

Contact: National Starch and Chemical Information Centre, 114 Mayfield Ave., Edison NJ 08837, the United States. Fax: +1 (732) 4175 696; E-mail: nstainquiry@adh.com.

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Contact: Mr. Tanvir Ahmed, India Trade Promotion Organization, Pragatim Bhavan, Pragati Maidan, New Delhi 110 001, India.
Tel: +91 (11) 3325 738/3318 143;
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E-mail: itpo@asdl01.vsnl.net.in.

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25th International Food and Beverages Exhibition 2000

Contact: Mr. P.K. Bhandari, India Trade Promotion Organization, Pragatim Bhavan, Pragati Maidan, New Delhi 110 001, India.
Tel: +91 (11) 3328 239;
Fax: +91 (11) 3318 135/142.

8-11 Mar
Hyderabad
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Poultry Expo 99/2000

Contact: Tafcon Projects (India) Pvt. Ltd., C-60, Nizamuddin East, New Delhi 110 013, India.
Tel: +91 (11) 4633 881/889;
Fax: +91 (11) 4635 215/4644 077;
E-mail: tafcon@del2.vsnl.net.in.

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Interfood Ukraine 2000

Contact: ITE Group Plc., 105 Sausbury Road, London NW6 6RQ, The United Kingdom.
Fax: +44 (20) 7596 500;
E-mail: enquiry@ite-exhibitions.com.

26-29 Apr
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Fax: +44 (20) 7596 500;
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E-mail: china@montnet.com.

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