



## Laboratory information management systems

# Ensuring optimum food quality

Despite experiencing high growth rates and having the potential to become the largest food producer in the world, India's contribution to international food trade is almost negligible. This is mainly because the country still lags behind foreign countries in terms of technological advancements, infrastructure and food safety regulations. This article focusses on laboratory information management systems (LIMS), which is a software that will not only help companies achieve compliance with established guidelines & requirements but also increase efficiency.



### Colin Thurston

India is currently the world's second-largest food producer and has the potential of becoming the largest in the near future. Moreover, the country ranks second in the world in the production of fruits & vegetables, and first in milk. The Indian food processing sector has emerged as one of the major drivers of the country's economic growth, triggered by surplus food and changing consumption patterns towards a more varied & nutritious diet. In 2006, the sector was worth \$ 29.4 billion in a total food market of approximately \$ 91.7 billion. According to the US Department of Agriculture (USDA), in 2008, India's

agriculture and food exports to the US grew by 19.2 per cent.

However, India presently accounts for less than 1.5 per cent of the international food trade. The lack of advanced technologies for better processing, preservation and storage of food, along with shortcomings in transport infrastructure results in significant quality deficiencies for India. Also, the safety of food in India can be compromised throughout the food production process, right from crop growing and raw materials gathering to processing, packaging, distribution and retail sales. For example, farmers utilise approximately 30,000 tonne of pesticides every year throughout



## LAB TECH



India's agricultural industry, ultimately impacting the safety of soil, water and food. As major export markets like the US and EU restrict the use of pesticides in the food chain, this could potentially harm India's future growth plans.

### Safety regulations

Several acts and orders have been established in India with the aim to safeguard food quality & safety and the health of consumers. However, each of these acts and orders was administered by different government departments & ministries, resulting in substantial implementation problems. The Food Safety and Standards Act 2006 consolidated the various laws and established the Food Safety and Standards Authority of India (FSSAI), responsible for laying down science-based standards for articles of food and regulating their manufacture, storage, distribution, sale and import.

The overall aim of this Act is to ensure the availability of safe and wholesome food for human consumption. Food additives and processing aids have to be used only in accordance with the provisions of the Act, and foods should not contain contaminants including toxic metals, toxins, pesticide residues, antibiotics and veterinary drugs in excess of limits prescribed under the regulation.

### International norms

Indian food companies must comply with international regulations in order

to gain a larger share of the global food trade. In the US, imports of meat, poultry and egg products are controlled by the Food Safety and Inspection Service (FSIS) of the USDA, while the US Food and Drug Administration (USFDA) ensures the safety of all other imported foods. Countries that export food products must have an inspection system

equivalent to that employed in the US. Only after this equivalence has been established, foreign countries are eligible to ship products. Moreover, regular on-site audits of the eligible foreign inspection systems and re-inspection of products upon arrival at the ports are performed to verify on-going equivalence.

Food and feed imported into the EU must comply with the safety requirements set by the EU Guidance on Imports. The food hygiene import systems for food of animal origin are not entirely the same as for food of non-animal origin or food containing both, ingredients of animal as well as plant origin. More stringent controls are enforced in the case of products of animal origin. These must be presented at the border inspection post accompanied by all the relevant certificates required in the EU veterinary legislation. Food companies outside the US and EU have a general obligation to monitor the safety of products and production processes while the competent authority of the exporting country must guarantee the compliance or equivalence with EU and US requirements.

### Keys to efficiency

Investment in state-of-the-art-technology is required to create the necessary infrastructure that will allow Indian food companies to perform timely and dependable product safety testing in compliance with native and global regulatory requirements. LIMS as well as advanced liquid chromatography

tandem mass spectrometry (LC/MSn) and gas chromatography tandem mass spectrometry (GC/MSn) technologies can be utilised to help meet safety challenges across the entire food production process.

### Role of LIMS

LIMS operates as a central data repository that gathers, stores and reports on analytical data drawn from multiple laboratory instruments, allowing real time and fully automatic management & control of the quality assurance process. Regulatory compliance of food products can be easily verified using LIMS, which can alert the food producer to a potential failure to meet acceptable limits. This triggers further investigation early in the production process and prevents contaminated food products from being distributed to the consumer.

LIMS can be used to schedule the systematic testing of sample batches at specific control points, which addresses the food producer's need for immediate notification of contaminants in the production chain. It satisfies regulatory requirements for a screening process to identify not only potential sources of contaminants but also the point in the production cycle where that contamination occurred. Utilising a sophisticated LIMS solution enables food producers to manage batch





relationships between raw materials, processed materials & packaged goods, further protecting the consuming population from harmful food products.

Further, LIMS can accommodate different types of data including sample preparation data, instrument generated data, standards, reagents & media, reference data for users and management & metric reports. In addition, LIMS can be relied on to identify instrument calibration & service requirements and report on the specific parts that need replacing, thus ensuring that every testing procedure continues uninterrupted and in compliance with established regulations.

LIMS is used in conjunction with sample collection & preparation devices, instrumentation, chemicals and consumables to form a complete food safety testing solution. Advanced benchtop LC/MSn systems accommodate the most demanding compound screening and identification applications. High resolutions allow the identification of pesticides, metabolites and other target compounds within difficult samples, with excellent mass accuracy in both positive as well as negative modes. Coupled with federal aid information management system (FAIMS), GC/MSn and GC/MS with highly selective reaction monitoring (H-SRM) capability achieve food safety testing even in complex samples with heavy matrix effects.

Way ahead...

Indian food processing companies should perform precise & real-time product safety testing at all stages of production, processing and distribution in order to ensure highest product quality & compliance with domestic as well as global food safety legislation. Moreover, the Indian food processing industry requires increasing investment in food safety testing systems and the government had taken a number of steps like de-licensing of the sector, duty & tax relief and financial assistance for infrastructure building & setting up of food processing units to encourage investors. Novel LIMS solutions and instrumentation technologies play a significant role in the food safety monitoring process. Competent systems enable food companies to produce consistent results early in the production process, allowing the timely identification of quality deficiencies and minimising product recalls & the associated costs.



Colin Thurston is director – Product Strategy, Process Industries, Thermo Fisher Scientific. He is responsible for determining the strategy of Thermo Fisher's current portfolio while identifying new market opportunities within the process industry sector. He has worked for Thermo Fisher for the past 11 years in the development, sales, support, and marketing of laboratory software. For more details, contact Kath Darlington. Email: kd@scottpr.com

**KHASIYAT MASALAS**  
An ISO 22000 Certified Company  
Tel :- +91-79-22743454 Telefax :- +91-79-22745062 Mobile : 94260 88680  
E-mail : info@masalapaste.com Web : www.masalapaste.com

*Khasiyat*  
SOMETHING SPECIAL

|                         |  |                          |
|-------------------------|--|--------------------------|
| Shahi Masala            |  | Madresi Masala           |
| Bolni Masala            |  | Malabari Masala          |
| Punjabi Masala          |  | Biryani Nazakat Masala   |
| Tava Masala             |  | Goan Masala              |
| Mumbai Masala           |  | Hydrabadi Khashta Masala |
| Kadhni Masala           |  | Narabi Mahak Masala      |
| Handi Masala            |  | Gulmargi Masala          |
| Bhuna Style Masala      |  | Pani Puri Masala         |
| Pahadi Sangath          |  | Tea Masala               |
| Ghutti Mix Masala       |  | Fulvadi Mix              |
| Afghani Masala          |  | Dakar Gota Mix           |
| Mughlai Heritage Masala |  | Sambhar Mix              |
| Kolhapuri Masala        |  | Vindaloo Paste           |
| Kala Masala             |  | Tandoori Paste           |
| Mevadi Lahejat          |  | Chicken Tikka Paste      |
| Udipi Masala            |  | Chicken "65" Paste       |
| Rajvadi Thath           |  | Kebab Paste              |
|                         |  | Duxini Paste             |

**Jas Enterprises**  
An ISO 9001 : 2008 Certified Company

|                              |                              |   |
|------------------------------|------------------------------|---|
| <br>NOODLE / CHOW MAKING M/C | <br>PANIPURI MACHINE         | <br>MINI PULVERISER WITH WATER CIRCULATING SYSTEM |
| <br>ALMOND CUTTING MACHINE   | <br>MULTI CHAMBER PULVERISER | <br>DALIYA MAKING MACHINE                         |
| <br>KHANDAP M/C              | <br>MIXER GRINDER            | <br>DRY CUM WET GRINDER                           |
| <br>MASALA / SPICE MILL      |                              |   |

MANUFACTURER OF : MINI DAL MILL, IMPACT PULVERISER, JUICER, CHAPATI MACHINE (SEMI AUTOMATIC), VEGETABLE CUTTING MACHINE, GREAVY MACHINE, HAMMER MILL, VERMICELLI MACHINE, PAPAD / CHORAFALI, MATHIYA MAKING MACHINE (SEMI AUTOMATIC)

50, Shreenathji Estate, Nr. Soni ni Chawli, Panna Estate Road, Rakhial, B/h. B.O.C. GASES, AHMEDABAD-380023 Gujarat India.  
Tel :- +91-79-22743454 Telefax :- +91-79-22745062 Mobile : 94260 88680  
E-mail : info@jasenterprise.com Web : www.jasenterprise.com