The use of Laboratory Information Management Systems in the food sector

Colin Thurston considers the valuable role of Laboratory Information Management Systems in the dealing with food safety issues and regulatory compliance

Introduction

Over the last few years, food safety incidents in the USA have been increasing at a fast pace, generating strong public concerns about the safety of the foods they consume. Most recently, a Salmonella outbreak linked to peanut butter and products made with peanut paste sickened at least 529 people in 43 States, sent at least 116 people to the hospital and may have contributed to 8 deaths, according to the US Centers for Disease Control and Prevention. Related to this most recent food contamination incident, the US Food and Drug Administration (FDA) has recorded more than 2,100 products in 17 categories that have been voluntarily recalled by more than 200 companies, and the list continues to grow. The large number of products and brands that have been recalled as well as the large quantities of some of these products, makes this one of the largest food recalls ever in the USA. What was once considered the ubiquitous comfort food of children in many parts of the world is now suspect and the public is left wondering what is safe and what companies are trustworthy with regards to utilising the most stringent safety practices in the preparation of food items.

Regulatory framework

Historically, the management of food safety initiatives has been spread across numerous agencies worldwide. In the USA, for example, the various regulators’ staffing for food inspections has been tragically low in light of the volume required to manage safe agriculture processes, beef, poultry and pork processing, dairy and produce. For prepared foods, separate and non-aligned inspections by different agencies are required if a finished product contains meat or dairy or both. This lack of adequate manpower and the separation of responsibilities based on the type of food are only adding to the ineffectiveness of the regulatory agencies and causing further confusion and dismay amongst the consuming public. Perhaps a look at the regulatory set-up that exists in the USA and the European Union (EU) will illustrate just how complex the issue of food safety can be.

The US and EU regulatory systems

The US regulatory landscape makes a number of different government agencies responsible for various aspects of food safety: the FDA, USDA (US Dept of Agriculture), ATF (Bureau of Alcohol, Tobacco and Firearms) and EPA (Environmental Protection Agency) all have different regulatory accountability dependent upon the segment of the food supply chain. For example, the FDA has responsibility for general food products and beverages, except for processed egg products, meat and poultry, fruits, vegetables and other plants which are under the remit of the USDA. Combination products (e.g. stew, pizza) may fall under either the FDA or USDA depending upon their make-up ingredients. All alcoholic beverages, except wine containing less than 7% alcohol, are regulated by the ATF. The EPA determines the safety of pesticides and tolerance levels for pesticide residues in food.

These complex multi-agency responsibilities result in a public perception of a confused government attitude to the nation’s food supply. Newly-elected President Obama recently declared that the current regulatory framework “… is a hazard to public health”. It is widely expected that new legislation will be proposed to overhaul the US approach to consumer safety. In the mean time, the FDA has recently received $300m in additional funding, of which half is to be used to increase the number of domestic and overseas inspectors.

The EU enforces regulations with the aim of achieving the highest possible level of protection of human and animal life and health, plant health and the environment. In addition, the regulations aim at achieving EU-wide free movement of human food and animal feed. Adopting a comprehensive, integrated “farm-to-table” approach, the regulations cover all aspects of the food production chain, with a single overarching framework. There are specific regulations applying to imported food that contains animal products, e.g. meat, meat pies, salami, poultry, fish, eggs, milk, dairy products, and honey. These products must be presented at a border inspection post accompanied by all the relevant certificates required in EU veterinary legislation. Less strict legislation is implemented for food that has no animal content such as fruit, vegetables, cereals, certain bakery products, herbs, spices, mineral water and fruit juices.
Food companies in developing nations 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 requirements. In general terms, food products must be tested to ensure conformance to specifications and product safety whether they are destined for human or animal consumption. Testing must address the complete spectrum of food safety issues, including veterinary drug residues, pesticides and toxins such as mycotoxins and marine biotoxins, pathogens, trace elements and chemical residues including environmental pollutants. Regulatory requirements are dictated by the location of the consumer, and therefore, complex testing requirements and specifications will inevitably exist where products are provided to multiple geographic markets. This complex backdrop of laboratory analysis means that Laboratory Information Management Systems (LIMS) are an essential tool for the management of results and therefore play a significant role in this process.

LIMS capabilities in food safety testing

For food producers, traceability through all steps of production, processing and distribution is critical in the effort to monitor quality, effectively manage recalls and limit product and revenue loss. A LIMS offers a secure environment for the management of batch relationships between raw materials, processed materials and packaged goods. A LIMS automatically captures sample data, checks for out-of-specifications and limits product and revenue loss. A LIMS offers a secure environment for the management of batch relationships between raw materials, processed materials and packaged goods. A LIMS automatically captures sample data, checks for out-of-specifications and limits product and revenue loss. A LIMS offers a secure environment for the management of batch relationships between raw materials, processed materials and packaged goods. A LIMS automatically captures sample data, checks for out-of-specifications and limits product and revenue loss.

Application examples

Chr. Hansen

One of the largest food ingredient companies in the world, Chr. Hansen achieve its goal for optimum product quality. In Denmark, France, Germany and in Denmark, France, Germany and in Denmark, France, Germany and...