Rising food safety drives advances in technology

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When consumers browse through supermarkets and choose which food to buy, they are generally making judgements on taste, visible quality, and cost. Of course if you actively surveyed them and measured these priorities, one important factor would be added to that equation – safety.

Food safety is virtually impossible for the consumer to actively assess in the supermarket aisle. The shopper must rely on good industry practice and robust state regulation to have confidence that the food they put in their shopping trolley, and ultimately on their table, is fit for consumption.

One only has to consider the impact on food markets when scandals emerge, to demonstrate the importance of food safety. The horse meat scandal of 2013 resulted in a 43% decrease in the purchase of frozen hamburgers and ready meals in the UK and saw one of the top supermarket giant's market value fall by €360 million. Consumers react rapidly and the economic effect on markets can be dramatic.

One of the biggest areas of concern is the presence of drug residues in food, and international regulators are continuously introducing new standards in order to protect consumer health. A key factor in this effort is the rising problem of antibiotic resistance.

Biochip Array Technology from Randox Food Diagnostics.

Growth promoters such as salbutamol and clenbuterol have been used by the livestock industry for over 30 years to improve an animal's ability to utilise nutrients and produce leaner, more affordable meat.

Evolution sees microbes adapt and survive in the face of current treatments, and inappropriate use of antibiotics in food production is now officially recognised by the World Health Organisation as one the main drivers of this global challenge. Similarly, high-levels of veterinary drugs in food produce can present toxicity or allergic reactions in humans if consumed beyond recommended levels.

Due to increasing food safety regulations, consumer opinion and retailer pressure it has been necessary for food industries to implement greater testing measures to ensure that food products are suitable for human consumption. The EU directive 96/23/EC dictates that member states should test various food matrices including meat, fish, eggs, honey and milk for drug residues.

As countries globally have surveillance programmes in place for import and export of food, the industry must monitor the levels of residues to ensure no drug is above the acceptable maximum residue limits or present at all in the case of those drugs which are totally banned.

Industry response

So how does the industry cope with this increasingly complicated web of regulation? The key is technology.

Producers and processors must be able to screen for more drug residues, efficiently and accurately so they can be confident that their products meet all of the required standards.

As more and more companies recognise the need to invest in modern systems to meet these demands, one key element is common in the solutions they seek – multiplexing.

Multiplexing gives food producers the ability to test for multiple analytes from a single sample.

Randox Food Diagnostics have been at the forefront of this safety revolution with their own Biochip Array Technology in the form of the Evidence investigator series.

However, there are a number of systems on the market, so what are the key elements people should consider when seeking a solution to food testing?

Ease of use

Any system that requires a high degree of technical knowledge to operate is going to add to labour costs. Likewise complicated sample preparation procedures can limit the speed of systems and major consumables are another consideration that can add to operating costs.

Biochip Array Technology requires a lower level of technical expertise to operate

than other confirmation systems such as LCMS/MS and HPLC and its ease of sample preparation is popular with customers.

Reliability and efficiency

When it comes to food safety and drug residue screening, any system is defined by its reliability. Inaccurate results and false positives can have a dramatic effect on production lines or commercial relationships. With far fewer false positives than other methods (<5%) the Evidence series reduces the time and cost associated with confirmatory testing.

Efficiency is the key factor when considering moving to a multiplexing system. Producers and processors need to be able to screen for as many different substances simultaneously as can be reliably achieved.

Developed through a decade of research and an investment of over £200m, Randox Food Diagnostics' unique Biochip Array Technology can rapidly detect up to 22 separate analytes from a single sample.

Flexibility

The veterinary drug market is changing all the time. Different substances will appear on the market, and these may vary from country to country. Regulations will be

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applied to these new drugs, or indeed can be changed around existing substances. The key therefore is flexibility and adaptability. For example, Randox Evidence Investigator can be used to analyse a variety of matrices including meat, seafood, eggs, urine, honey, feed and grain.

Randox's menu of tests is one of the most impressive anywhere in the world and continues to grow each year. We have over 70 new targets in development to account for our future developments and market changes. So what drug residues are processors trying to detect?

- **Antimicrobials.**

Antimicrobial compounds have been used in food production both to treat infections and disease. Randox Food Diagnostics offers four different antimicrobial testing platforms. The excellent generic nature of our antibodies allows detection of drugs of a similar chemical structure, for example, our Antimicrobial II Array can detect 17 different quinolone compounds along with 10 tetracycline compounds including metabolites and epimers.

- **Anthelmintics.**

Anthelmintics are drugs that act against internal parasites of animals such as tapeworms, liver flukes and round worms that can cause helminthic infections. The use of anthelmintic drugs can greatly improve livestock production, however effective monitoring is required to ensure residues are not passed into the human food chain.

- **Growth promoters.**

Growth promoters such as salbutamol and clenbuterol have been used by the livestock industry for over 30 years to improve an animal's ability to utilise nutrients and produce leaner, more affordable meat.

Anabolic steroids along with ractopamine and other growth promoting substances must also be monitored very carefully in meat and animal feed as insufficient withdrawal periods can lead to contaminated meat entering the food chain.

Randox Food Diagnostics, through continued R&D and specialist expertise, are ensuring customer confidence from 'farm to fork'. ■

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