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The Danger of Leaving Food Safety Strategy to Chance

Putting the Rigour into Challenge Testing

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A Leatherhead Food Research white paper

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Grzegorz Rachon discusses the risks companies expose themselves to when they fail to take food safety seriously and explains the rigour you should expect from challenge testing.

In the UK alone, up to one million cases of food-borne illness are reported each year, hospitalising around 20,000 people and killing around 500[1].

The costs of pathogen outbreaks to the food and drink industry are substantial. Suspected products and ingredients contaminated with pathogens must be withdrawn immediately from supermarket shelves and safely incinerated. Companies also face prosecution, with fines and/or imprisonments imposed, which reflect the degree of 'harm' caused to consumers.

Some companies never recover from the financial and reputational fallout. The Peanut Corporation of America (PCA) was forced out of business after causing a significant Salmonella outbreak in the United States during 2008 and 2009. The Chief Executive was sentenced to 28 years in prison.

Taking food safety seriously

Pathogen outbreaks can be avoided. By investing in the right food safety and quality control procedures, companies can significantly reduce the risk of pathogen contamination during the food production process.

It is too risky to make food safety a box-ticking exercise: implemented the HACCP system, tick; evaluated the risk of cross contamination, tick; determined shelf life, tick. It is essential to interrogate each of these procedures and ensure that they have been carried out in a rigorous way. You need to be absolutely confident that you have done everything you can to eliminate pathogens.

Having a strategy in place which successfully evaluates risk across the entire production process will reap rewards in the long term and reduce the chance of exposing consumers to serious food-borne illnesses.

Challenge testing: a vital food safety tool

Challenge testing involves deliberately contaminating food products with relevant microorganisms to understand issues that may arise during processing, distribution and storage.

It is a well-established food safety and quality validation step and provides the most direct evidence of product safety and stability. It remains the best way to predict shelf life of the product, validate efficiency of heat treatment or process or understand behaviour of bacteria in the food.

[1] Health Protection Agency

Through challenge testing you can:

- Determine microbial growth, survival and death in foods
- Evaluate effectiveness of packaging, food preservatives and additives
- Determine the extent of lethality, or kill, delivered by the process or treatment

Questions to ask about challenge testing

The data you obtain from challenge testing is only as good as the methodology used. So how can you judge if challenge testing is rigorous enough? If you or your provider aren't thinking about the following questions when carrying out challenge testing, then you might be basing you food safety decisions on unreliable data.

Question 1: Which organisms to choose? A product can be injected with any contaminant, but which are relevant to the product or process being tested? An understanding of the historic illness outbreaks connected with the product or process, as well as an awareness of current foodborne outbreaks are crucial.

Question 2: How to inoculate (or contaminate) the product? Both the level of inoculation and the method of inoculation can be challenging. Leatherhead draws on their experience of delivering bespoke challenge tests to ensure the composition of the food remains unchanged during inoculation and yet at the same time achieving the desired dispersal of organisms throughout the sample.

Question 3: How long is a challenge study? The product has to be tested for the whole of its shelf-life and for a period beyond, as it is important to know the impact of the product if consumed after its best-before date. The challenge is to obtain adequate data from different stages of a product's shelf life to understand the bacteria behaviour of the challenge bacteria in the food product and to satisfy relevant regulatory bodies.

Question 4: In what environment should we test the product? Test samples should preferably be stored and packaged as they would be in the commercial marketplace so the testing is truly representative. It may also be necessary to test at non-optimal conditions (such as testing refrigerated products at different temperatures) to assess the impact of these on the safety and shelf-life of the product.

Question 5: How do we analyse the data? Interpreting the results of the challenge test and drawing meaningful conclusions is the final challenge. Trend analysis and graphical plotting of the data will show whether the challenge organisms died, remained stable, or increased in numbers over time.

Including challenge testing in product reformulation strategy

At Leatherhead, we are carrying out an increasing number of challenge tests for clients. One of the drivers for this has been product reformulation. Any product reformulation, even minor tweaks, changes a product structure and it is vital to understand how this in turn impacts the behaviour of microorganisms.

If you can be confident in your food safety strategy, you can focus your time and energy on reformulating and marketing your product. Importantly, there won't be any nasty pathogens hiding around the corner.

How Leatherhead can help

Contact Leatherhead Food Research for help with any of your food safety needs. Challenge testing can be used to predict the shelf life of a product, validate efficiency of heat treatment or process, or understand behaviour of bacteria in the food. Leatherhead can also conduct challenge testing to support the expert testimonies required in legal disputes.

About the author

Grzegorz Rachon is a specialist in microbiological challenge testing, process validation and heat resistance trials and gained 10 years of experience in this field at Leatherhead Food Research. In 2012 Grzegorz joined the Food Advanced Training Partnership program (Food ATP) undertaking a Professional Doctorate, with special interest in heat resistance and survival of pathogens in low moisture foods.

About Leatherhead Food Research

Leatherhead Food Research provides expertise and support to the global food and drink sector with practical solutions that cover all stages of a product's life cycle from consumer insight, ingredient innovation and sensory testing to food safety consultancy and global regulatory advice. Leatherhead operates a membership programme which represents a who's who of the global food and drinks industry. Supporting all members and clients, large or small, Leatherhead provides consultancy and advice, as well as training, market news, published reports and bespoke projects. Alongside the Member support and project work, our world-renowned experts deliver cutting-edge research in areas that drive long term commercial benefit for the food and drink industry.

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